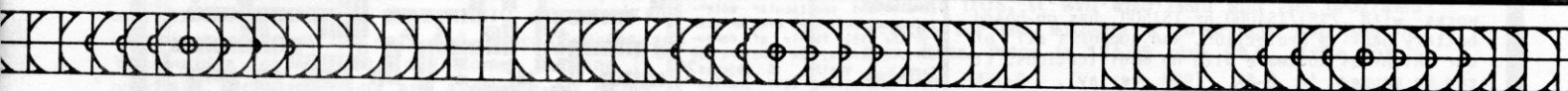


SyncWare News

The journal for technical
applications of T/S
computers

Volume 4 Number 6

Jul.-Aug. '87



A Bird in Hand...

Our favorite computers are getting harder and harder to find. TS1000's are no longer being offered except from an occasional surplus dealer. The 2068's can still be found, but not without some difficulty. My trusty 2068 gave up the ghost during the assembly of this issue. After calling almost every vendor in my files, I located two that had 2068's to sell. Sunset Electronics, (415) 665-8330, in San Francisco, CA, and Brooklyn Closeout Corp., (718) 384-3519, Brooklyn, NY, have for sale factory re-conditioned units. Contact Mr. Warbuton at Sunset Electronics or Mr. Fried at Brooklyn Closeout for pricing and details.

If you have a working computer, my advice is to treat it like gold. Replacements will soon be impossible to obtain. Unfortunately, this marks the final stages of computer 'orphan-dom' and will ultimately lead to the demise of our beloved computer systems.

The Fame and Glory

After much deliberation, the winners of The SyncWare News 2nd (sort of) Annual Programmers' Competition have been decided. The winning programs are presented in this issue for your use and amusement.

First place in the TS1000/1500 category goes to Alex R. Sweitzer for his program "Multsteps" which teaches students to multiply a 3 digit X 2 digit number. A Byte-Back MD-2B Modem is on the way to Fayette City, PA.

L. Liedtke of Ridgecrest, CA is the winner of the TS2068 portion of our contest. Mr. Liedtke's "Animal Kingdom" program entitles him to a 32K Non-Volatile RAM Cartridge Board.

The Grand Prize Winning program not only interacts with humans, but with the computer too. M*5, by Paul Holmgren, takes us from the rolling plains of Indianapolis, IN, to the outer reaches of our solar system where we've got to find our way back safely home by correctly identifying the planets in orbit about our sun. This adventure in education earns Paul a Writeman NLQ Dot Matrix Printer.

The names of all the contestants appear in this issue. As space permits we will be printing the listings and descriptions of the programs that were submitted.

Multiple character sets, 256x192 graphics, 64-column screens, UDG's, even SPRITES are now available for your computer!

"Hunter" board, or similar designs (see SyncWare News vol. 4 no. 1 for one such project costing under \$10). Alternately, consider our BK "SCRAM" board (described below).

is our ONLY specialty. Our goal is to develop the most progressive software ever created for these machines. We feel that the software listed below propels these machines into mainstream computing; we think that you'll agree.

" SCRAM" NVM BOARD

tional equivalent, at a lower price! This board works with ZX81/TS1000 or TS1500, has on-board battery back-up protection, and supports all of our high-res software with no modifications. It can be mapped in 0-8K (ROM overlay), 8-16K (normal operation), even 16-24K or 24-32K.

Other features include:

- * DIP switch to deselect 2K blocks
- * Board enable switch
- * Write-protect switch
- * RESET switch easily installed (optional)
- * Very low power drain
- * Feed-through connector
- * FULLY ASSEMBLED! Just plug it in.
- * Use with other machine-code software

PRICE: \$39.95 including shipping.



SRAM HI*RES EXTENDED BASIC is the flagship of our new line of software. With this remarkable package YOU can write high-resolution applications... ENTIRELY in BASIC! While using only 4K of memory, SRAM HI*RES adds 38 new hi-resolution commands. If you know how to program in Sinclair BASIC, you will find SRAM HI*RES easy to learn and use. A revolutionary syntax system allows ANY variables or expressions to be used in your commands. No REMs to pass parameters; No POKEs: A singleUSR call is used for ALL commands. Most commands can be chained into MULTIPLE STATEMENT LINES: We even included a fast (8.5x normal) set of tape routines! The most reliable tape system ever written. Other features:

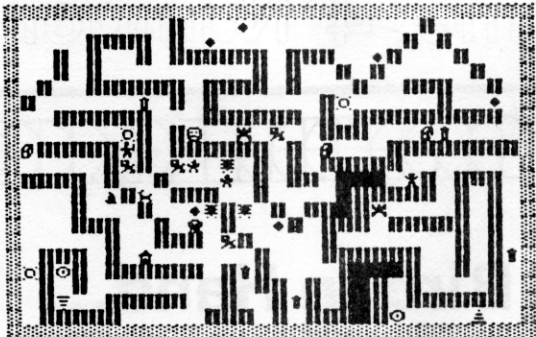
- * Three 32-column PRINT modes
- * Lower-case and new symbols
- * 64-column PRINT mode
- * 128 User-defined characters
- * Scroll WINDOWS any direction...
 - a pixel at a time!
- * Up to 32 TRUE sprites! Speed adjustable.
- * Invert windows or entire screen
- * Software-only video reverse
- * PLOT, DRAW, CIRCLE, RECTANGLE, TRIANGLE
- * TS2040 printer supported
- * Much more!

PRICE: \$24.95 incl. complete manual & shipping

DUNGEON OF YMIR

This D&D-style graphic adventure game is the most challenging, complex and spectacular entertainment software ever written for the ZX81 family of computers. 9 levels, 124 monsters (16 types), 5 spells, 15 objects. VERY addictive, VERY challenging, VERY impressive graphics. 100% machine-code, yet takes up all available memory in 15K. One reviewer calls it "5-star software" and "a must have." We know that you'll agree.

***** NEW LOWER PRICE *****
PRICE: \$19.95 including shipping



A King Minotaur

YEAR-AT-A-GLANCE

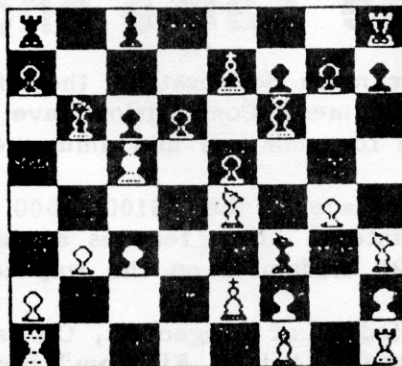
This calendar/appointment book program demonstrates the power you have using SRAM HI-RES Extended BASIC. Enter, update, delete, list, print messages and reminders for any day of any year 1800-2099. Program structure will remind you of much larger machines which shall remain nameless....

PRICE: \$9.35 including shipping.
*** SEE SPECIAL OFFER BELOW ***

S-M-T-W-T-F-S-S												S-M-T-W-T-F-S-S												S-M-T-W-T-F-S-S											
1 9 6 7												1 2 3 4 5 6 7												1 2 3 4 5 6 7											
4 5 6 7 8 9 10 11												9 10 11 12 13 14												9 10 11 12 13 14											
11 12 13 14 15 16 17												15 16 17 18 19 20 21												15 16 17 18 19 20 21											
18 19 20 21 22 23 24												22 23 24 25 26 27 28												22 23 24 25 26 27 28											
25 26 27 28 29 30 31																								29 30 31											
S-M-T-W-T-F-S-S												S-M-T-W-T-F-S-S												S-M-T-W-T-F-S-S											
1 2 3 4 5 6 7												1 2 3 4 5 6 7												1 2 3 4 5 6 7											
5 6 7 8 9 10 11												12 13 14 15 16 17												12 13 14 15 16 17											
12 13 14 15 16 17 18 19												18 19 20 21 22 23 24												14 15 16 17 18 19 20											
19 20 21 22 23 24 25												24 25 26 27 28 29 30												21 22 23 24 25 26 27											
26 27 28 29 30												31												28 29 30											
S-M-T-W-T-F-S-S												S-M-T-W-T-F-S-S												S-M-T-W-T-F-S-S											
1 2 3 4 5 6 7												1 2 3 4 5 6 7												1 2 3 4 5 6 7											
5 6 7 8 9 10 11												9 10 11 12 13 14 15												6 7 8 9 10 11 12											
12 13 14 15 16 17 18 19												16 17 18 19 20 21 22												12 13 14 15 16 17 18 19											
19 20 21 22 23 24 25												23 24 25 26 27 28 29												20 21 22 23 24 25 26											
26 27 28 29 30 31												31												27 28 29 30											
S-M-T-W-T-F-S-S												S-M-T-W-T-F-S-S												S-M-T-W-T-F-S-S											
1 2 3 4 5 6 7												1 2 3 4 5 6 7												1 2 3 4 5 6 7											
4 5 6 7 8 9 10 11												9 10 11 12 13 14 15												6 7 8 9 10 11 12											
11 12 13 14 15 16 17 18												15 16 17 18 19 20 21												13 14 15 16 17 18 19											
18 19 20 21 22 23 24 25												22 23 24 25 26 27 28												20 21 22 23 24 25 26											
25 26 27 28 29 30 31												31												27 28 29 30 31											

YOU ZX-81

01	B2-B3	E7-E5
02	C1-A3	B8-C6
03	A3-F8	E8-F8
04	G1-H3	G8-F6
05	D2-D4	C6-D4
06	E2-E4	F6-E4
07	F1-A3	C4-C3
08	D1-D3	C3-D3
09	C2-C3	D8-F6
10	D3-C4	C7-C6
11	G2-G4	D4-F3
		CHECK
12	E1-E2	B7-B5
13	A3-B5	D5-B6
14	C4-C5	F8-E6
15	B5-D6	E3-E2
16	D6-E4	D2-D4
17		



SPECIAL OFFER

If you purchase our "SCRAM" NVM board and SR401 HI*RES EXTENDED BASIC and mention this ad, you'll get a FREE copy of YEAR-AT-A-GLANCE. Offer good only until July 1, 1987.

The Peak of Quality... from SILICON MOUNTAIN COMPUTERS

C-12, Mtn. Stn. Group Box, Nelson BC V1L 5P1, CANADA (604)352-1668

FOR YOUR SUPPORT

SHAWN STAMP, 3405 Mark Lane, Norton, OH 44203, (216)825-8957, challenges you to see just what your TS2068 is capable of doing! CHOPPER COMMAND is billed as a fast-paced action game that takes over where Rambo left off. As a chopper pilot in the Air Force, you rescue POW's from the jungles of Vietnam. Comes on cassette with instructions to transfer the program to you disk system for only \$17.50 (includes S&H).

CHIA-CHI CHAO, 73 Sullivan Drive, Moraga, CA 94556-1209, has his latest catalog available. Included in its pages are bargains like Diamond Mike II and the Great Game and Graphics Show, both for only \$10. Compass, the 2068 BASIC compiler/Z80 assembler program for only \$10. Word Twister and Vocabuilder for only \$10 and Money Machine II for only \$11. Most programs are available on either cassette or Aerco disk for the TS2068.

ROBERT D. HARTUNG, 2416 No. County Line Road, Hometown, IN 46748, (219) 6373081, has offered to place orders for Beta Basic 4.0 through the British supplier for pre-paid US customers. BETA BASIC 4.0 allows structured programming and procedures on Spectrums of Spectrum-emulated computers by 100 new commands and functions to the machines. The cost is \$26 plus \$1.50 for handling in US funds by check or MO. Contact Mr. Hartung for more details.

WEYMIL CORPORATION, Box 5904, Bellingham, WA 98227-5904, is introducing the Delta Device, a non-volatile memory system for the TS1000 designed by Mr. Wilf Rigter. The Delta Device is a full 32K NVM board featuring the Rigter Operating System. The 32K is divided into 8k blocks which are controlled by DIP switches allow mapping to various memory locations. The Rigter Operating System is a powerful file handling system with commands that include DIRECTORY of memory resident programs, SAVE, NAME/RENAME, MERGE, and EXIT. The cost is \$75 plus \$5 S&H.

Fred Nachbaur announces "ZX-TERM*80". This full-feature terminal program requires only a SCRAM board (or equivalent), plus 16K or more RAM and a Westridge or Byte-Back modem. Features 40, 60 or 80-column screens, separate adjustable windows for input and output, Xmodem up/downloading of ASCII files, Sinclair programs, or Sinclair variables. Custom graphics sets possible. Supplied with relocater, user options, "useful POKEs" for customization, and technical info for hackers. Takes only 4K of user RAM (plus the 8K static RAM area), so allows over 10K for files even in 16K. \$24.95 from SILICON MOUNTAIN COMPUTERS, C-12 MTN. STN. GROUP Box, NELSON BC V1L 5P1 CANADA

E. A. BROWN COMPANY, 3404 Pawnee Drive, Alexandria, MN 56308, (612)7638847, is currently distributing their latest catalog. Hardware and software items can be found for Timex, Atari-ST, and IBM computers and compatibles. Some bargains of interest to Timex computer enthusiasts are full size printers, 2068 Mikrodrives, and TS1000 and 2068 software.

RUSSELL ELECTRONICS, RD 1 Box 539, Centre Hall, PA 16828, has released their latest catalog which includes software and hardware for the Sinclair QL, and Timex TS2068 and TS1000. Many specials are available on numerous hardware items for the TS2068 and TS1000. Write for the current catalog.

THE CUYAHOGA VALLEY SOFTWARE WORKS, 615 School Ave., Cuyahoga Falls, OH 44221, is marketing SPDOS for the TS2068 and the J. L. Olliger Disc Interface. SPDOS is available for 40 and 80 track DS drives, supports sequential files, and offers a fast, versatile operating system that requires less than 8K of RAM. Fully compatible with Olliger memory resident DOS, it will also read and run programs written for the Millennia K Interface. Supplied on two disks. Price is \$24.95 plus S&H. Write for details.

TS-2068 SAFE DISK UPDATE, 1317 Stratford Ave., Panama City, FL 32404, (904) 871-4513, is a quarterly newsletter devoted to the support of users who have upgraded to disk drive systems. A section features the Olliger Safe Disk Operating System (SDOS). The annual subscription is \$12.

AN-TO PRODUCTIONS, 9009 West Elm St. #2, Phoenix, AZ 85037, is currently marketing QUICKKEY 2068 keyboard overlays. The overlays are available for the following programs: AccuDraw T2, Artworx v1.1, Tasword/Tasprint, Mscript (original and V5), and Omnicalc II. There is also a keyfinder and a blank overlay for your own programs. Price: \$6.95 each.

LARKEN ELECTRONICS, RR#2 Navan Ontario, Canada K4B-1H9, is currently marketing the LKDOS Cartridge. LKDOS is a replacement DOS for Aerco, Ramex, Olliger, and Larken Disc Systems, and claims to allow compatibility between the four popular TS2068 disk IF systems. LKDOS supports all the token commands such as LOAD, SAVE, CAT, ERASE, MERGE, OPEN, CLOSE, etc., and files types can be BASIC, code, or array. The DOS claims to be fully Spectrum and OS-64 compatible and supports NMI snap-shot memory saves when used in conjunction with the necessary hardware. Priced from \$65.00.

RMG ENTERPRISES, 1419-1/2 7th Street, Oregon City, OR 97045, (503)655-7484, announces the publication of ARCHIVE MASTER. This text delves into the inner workings of the QL program Archive, and contains over 100 tested procedures, tips, and tricks to help you make Archive an even more powerful tool. Published in a loose leaf format, ARCHIVE MASTER comes complete with its own binder. Price \$44.95.

CHARLES STELDING, 1415 South Baxter, Tyler, TX 75701, brings you TIMEX 2068 DESK TOP PUBLISHER. This new program allows the user to layout pages for bulletins, reports, announcements, newsletters, etc. The program will generate headlines, text, and allow placement of SCREEN's anywhere on the page. The user may also design his own fonts to add to the ones already included. For the 2040 and most dot matrix printers with appropriate interface. Price \$19.95 plus S&H, Olivetti 2300 version \$24.95 plus S&H.

FORUM

Spectrum Software Trouble

Dear Editor, I recently purchased a copy of "TOP GUN" from Ocean. My son and I thought this would be a super game to play on our TS2068 with ROMSWITCH as the game will allow two players to compete head-to-head using a split screen and two joy-sticks.

We loaded the game without any difficulty, selected the two player mode, then keyboard input. The split screen appeared, showing two aircraft carriers, each with a little jet ready to take off, but that's as far as we could get. The game was 'stuck'! None of the keys has any further effect on the game. We have tried every combination we could think of, but to no avail. Thus far, Ocean has not responded to several letters. If there is anyone who knows how to make the game proceed, we would appreciate hearing from them.

Along the same lines, several games, "TOP GUN", "ARCHON", and others, are set up for dual joy-sticks. Is there a dual port Kempston interface available for the TS2068? Such a device would add a new dimension to these games.

G. W. Goegelein
Phoenix, AZ

Mr. Goegelein- I don't personally know of such a dual Kempston joy-stick interface. Perhaps contacting a few of the good folks listed in our ads or For Your Support Column might turn up something. SyncWare News Volume 4 Number 3 (Jan.-Feb. '87) had plans and instructions for building and installing a single Kempston compatible interface. Perhaps this could be modified to work as a dual interface.-jdm.

The Fame & Glory

Listed below are the names of everyone who entered our 2nd (sort of) Annual Programmers' Competition. We sincerely thank everyone who entered. Future issues of SyncWare News will include some of their fine programs.

Alex R. Sweltzer
Basil Wentworth
L. L. Liedtke
Shawn Byrne
Bruce Shideler
Paul Holmgren
Frederick M. Lewis
Eugene Dorriere

Thanks again folks!

Rudnicki's Noble Principle

Only someone who understands something absolutely can explain it so no one else can understand it.

from Murphy's Law (c) 1986 by Arthur Bloch

Reader Replies

Dear Editor, If George Cary of Coloma, CA has a copy of Pro/File, then he can use the two POKes given in paragraph 2 of my article, Quick Print Your Pro/File & Tasword Files (SWN 4:5), to adapt the P/F driver routine to Spectrum mode. I use it all the time with my Spectrum Beta Basic. It runs my C. Itoh 8510 without any problems.

While on the subject of Beta Basic, if his RAMEX DOS and program software are Spectrum compatible, Lyle Luzum of Calmar, IA, could be using Beta Basic to get all the extra non-Timex functions he wants for his program. Beta Basic supports commands to kill a variable, print using, and allow entry of BASIC lines from a string, either directly from the keyboard or during a running program, with syntax checking.

Robert D. Hartung
Huntertown, IN

SyncWare

Thomas B. Woods
Jeffrey D. Moore
Fred A. Nachbaur
Thomas J. Bent

Publisher
Editor
Technical Director
Asst. Editor

All subscription information, billing, and ad artwork should be addressed to:

SyncWare News
PO Box 64
Jefferson, NH 03583
(603) 586-7734

Article submissions, Forum, Support listings, Classified ads, and really easy questions should be addressed to:

SyncWare News
603 S. Mill St.
Louisville, OH 44641
(216) 875-1257

Article submissions, hardware, and everything else, especially the tough questions, should be addressed to:

SyncWare News
C-12, Mtn. Sta. Group box
Nelson, BC V1L 5P1
(604) 354-3858

Back issues of SWN are available for \$3.50 each. Volume #1 (for the 1000) is available for \$16.95.

SWN is done entirely on TS computers. Submissions are preferred as word processed text files recorded on good quality tape. Memotext for the 1000 and Mscript for the 2068 are the preferred word processors. Documents submitted in Tasword Two and other word processors must be done in 52 column format. If you do not have a word processor, but you feel you have a good idea, then don't hesitate too work it up and submit it. Complete writers guidelines are available upon request from the Ohio Editorial office. SWN pays authors about \$40.00 per page for original articles.

Bug Alert

Listing 1 of Quick Print Your Pro/File & Tasword Files has a slight error. Please change the last statement in line # 40 to read "GO TO 40" instead of the "GO TO 50" as printed. We regret any inconvenience this may have caused our readers.-ed.

Ask Fred

Dear Editor, I own a Smith Corona PWP System 8. There is a messenger module available for this word processor with interface cable connectors for various computers (not including the Timex line). Which connector should I purchase for my TX 2068?

Frances M. Jackson
Gary, IN

Francis-I am not familiar with the S/C PWP System 8. However, I presume that by "Messenger module" they are referring to what is more commonly called a "printer interface."

To use this with a 2068, there are a number of things you will have to determine. Firstly, on the "System 8" you must find out if it has a "Centronics Parallel" connector, or an "RS232 Serial" input. In either case, you will need a suitable printer interface to match the 2068 to the System 8. If it has a Centronics Parallel (CP) input, you will need a Centronics Parallel interface. These are available from Aerco, John Olinger, and Zebra Systems (see the ads in SyncWare News). If it is serial, contact Byte-Back Co.

The other point is that you referred to your computer as a TX 2068, rather than TS 2068. I presume, therefore, that you have one of the Portuguese Timex 2068's, rather than the Timex/Sinclair 2068. The difference between the two requires some additional explanation. When Sinclair came out with the ZX Spectrum, they changed the connections on the computer's expansion bus (as compared to the ZX81/TS1000). When Timex made the original TS 2068, they reverted the bus to make it ZX81/TS1000 compatible, allowing the use of their TS2040 printer and TS2050 modem with either machine.

Then, to make the "new" Timex 2068 Spectrum-compatible, they again changed the bus to match the Spectrum. If this is the machine that you own, very few (if any) of the add-ons developed on this continent will work with your machine. Your best (only?) recourse is to get an "Interface I" from England or from one of the importers of Spectrum hardware.

Hope this helps.-fn

Gossip Bytes

Novel Soft, 35 Candle Liteway, Willowdale, Ontario, M2R 3J5, Canada, (416)665-0290, has announced that their long time associate, David Ridge, will no longer be with the company. Unfortunately for us TS Users, Mr. Ridge has been made a better offer that he feels he can ill afford to pass up. Both SyncWare News and Novel Soft wish David the best of luck in his future endeavors.

In case any of you would want to send him a birthday card or something, Sir Clive's current address is Cambridge Computers, Sidney House, Sussex Street, Cambridge, England CB11PA.

Timelines is back! The former TS newsletter is again available to Timex users, only now as a BBS. This new BBS has a conference mode, XModem up/down load capability, and other features. Call (216)671-6922, 10 p.m. to 6 a.m. EST. and give it a try.

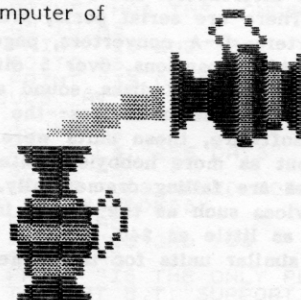
Chairman Paul Holmgren, of the Mid-West Timex Computer Fest, announces that the Fest mailing list is available for only \$2 and media. The list is in Tom Wood's Pro/File and can be put on cassette, Olinger disk, or a Proo/File Cart. Send your money and preferred media to Paul Holmgren, 5231 Wilton Wood Ct., Indianapolis, IN 46254. Print outs of the data are also available, contact Paul for details.

SyncWare Examines the IBM PC

OK, already I can hear you ask, "Why are you writing about the IBM PC in a Timex publication?" The short answer is that we are trying a little experiment to see what your reaction will be. The long answer is that for the past couple years, we have witnessed a slow but steady decline in our readership, and we want to do something to fix this problem. We believe that the declines we have experienced are similarly felt by most other firms in the Timex industry. There is only so far you can go when you work with an orphaned computer before changing interests, lack of repair facilities, and new computers coming out begin to take their toll. Since Timex stopped production of the computer, we have watched (sadly) our computer contract and suffer from a long protracted illness which will ultimately result in its death. It is truly amazing how long we all have held out, and how much vitality still remains, but the handwriting is on the wall.

At the same time, we have noted some very curious happenings on the other side of the computer world--in the land of the IBM PC. This computer started out as a high power business machine with a very expensive price tag. The price of the hardware alone was far more than a hobbyist could justify, and you couldn't buy software for under \$100. Clearly, this was a computer for business, not for the hobbyist. The entire PC industry revolved around this fact. Companies who sold software, computers, and peripherals didn't want to talk if you didn't have the money. But that was five years ago.

From the Computer of
Carl Jones



KNOWLEDGE AND LEARNING

Today is quite different. Illustrious Asian companies have figured out how to make computers which are electrically identical to the IBM and they have literally flooded the market with low cost "clones". Hundreds of companies sprang up almost over night which assemble the Asian produced circuit boards into full blown machines. Competition is fierce, and prices continue to plummet. Incredible numbers of these machines are in existence. IBM, itself, claims to have sold 6 million PC's, and it is estimated that they hold only half the market.

What we find curious about this situation is that the current trend of falling prices has taken the established PC hardware and software companies by surprise. They seem to be unable or unwilling to recognize the results of this flooding of the PC marketplace. That is, the PC is no longer a big business machine. It's now becoming a very attractive computer for small businesses and hobbyists.

We are seeing a whole new industry emerge to address the needs of these new PC owners. There are many parallels we can draw to the early days when the Timex computers first came out. This is getting us excited.

PC Info

Everywhere you go, you see books and magazines which cover the hardware and software aspects of the PC. With the Timex, our problems revolve around finding any type of information about the machine. There are only a few newsletters, and new books do not exist. Information problems with the PC revolve around dealing not with where to find it, but with what to do with it all. Book store shelves are filled with new books, and you can actually buy PC publications at the newsstand!

Cheap Software

Recently, a new method of selling software called "shareware" has emerged. Authors of programs place their work in public software "libraries". They ask people to try the program out before paying for it. Only if you are completely satisfied are you asked to pay the author. There are hundreds of these libraries across the country. Many claim to have as many as 600 to 1000 disks just crammed with programs. To order disks, you need only pay a nominal duplication fee and postage. Being able to choose from a collection of a thousand different programs would be pure ecstasy to a Timex owner.

Expansion Hardware

You say you want interfaces? The PC has interfaces up to its kazoo. There are serial ports, printer ports, A-D converters, D-A converters, page readers, video digitizers, RAM expansions, over 5 different types of video adaptors, hard disks, sound and voice synthesizers, voice recognition devices--the list is endless. As with software, these units were once quite expensive, but as more hobbyists enter the PC marketplace, prices are falling dramatically. The more common devices such as the RS232 interface can be picked up for as little as \$40. That is very competitive with similar units for the Timex.

What Does It All Mean?

As we see it, the current trends make the PC a very attractive computer--one which we think you should seriously consider for your next machine. The support is there, the expansion capabilities are there, prices are coming down, and we are finding that the new PC hobbyists are not the stuck up nose-in-the-air "ego-nerds" that used to snicker when we told them we used a Timex computer. They're hobbyists, just like us.

For SyncWare News, we see an opportunity to continue providing the same type of good stuff we always have, only for a much larger potential base of readers. Who knows, our circulation might increase to the point where we might even be able to PAY ourselves!

Over the next few issues, you will see more short pieces about the PC: What it is, how to program it, pitfalls, hints and tips. As we test the waters, we want you to tell us what you think. If its a total waste of time, please tell us so. If its a great idea, tell us that too. How we progress (or even WHETHER we progress) in this field will depend largely on reader feedback. So send those cards and letters in. We want to know what you think. Send comments to: The Editor, SyncWare News, 602 S. Mill St. Louisville, OH 44641.

LARKEN ELECTRONICS

DISK INTERFACES

- LARKEN 2068 / Spectrum DISK SYSTEM -----
- The system consists of the LKDOS cartridge and a Double Density rear disk interface. 800K on a Quad Drive
 - Fully 2068 / Spectrum compatible / OS-64 compatible
 - It uses all standard (Token) keyboard cassette commands CAT MERGE ERASE FORMAT LOAD SAVE PRINT and more
 - Uses NO RAM space . HAS 8K ROM and 8K RAM on board
 - NMI Memory Save Feature : PUSH-BUTTON program transfer
 - A KEMPSTON compatible Joystick port is also on the IF.
 - Also, 10 Extended Basic Commands for Graphics, Utilities and up to 3 scrolling Windows on the screen . An Aerco compatible printer driver is also in the Lkdos Cartridge
 - The disk interface is a compact rear mounted board that can support 1 to 4; 3" 3.5" or 5.25" SS,DS or Quad Drives
 - Easy to setup . 90 day guarantee

*** ATTENTION *** AERCO FD68 and RAMEX DISK USERS

.....

The LKDOS cartridge is now available for your disk IF's . It will allow your disk systems to be fully Spectrum and OS-64 compatible and Larken disk compatible and have all the commands mentioned above . Also a SNAP-SHOT save button can added . RAMEX users will now be able to use all the memory AERCO users can now have all of the above features plus the Lkdos uses the Aerco Ram as a RAM-DISK !

PRICES : (US)	2068/Spectrum Disk System	\$119.95
Add \$5 S&H	LKDOS Cartridge (Aerco,Ramex)	\$65.00
	ZX-81 Disk Controller	\$99.00
	256K Non-Volatile Ram Disk	(TBA)
	Drive Floppy cable	#8.00

* LARKEN ELECTRONICS RR#2 NAVAN ONTARIO CANADA K4B-1H9 *

The SyncWare News 2nd (sort of) Annual Programmers' COMPETITION

M * 5



BEST OVERALL by Paul Holmgren

Paul Holmgren got the idea for this program from one that appeared in "Sync" Vol. 3 No. 1 by Ronald Duguid. The program was originally written for the TS1000, which was the machine Paul first owned. After obtaining a TS2068, Paul used UPLOAD 2000 to move it to that machine. The version you have before you now is the result of much work expanding and rewriting it.

The questions are trapped from a direct repeat occurring. Since this is primarily a drill, you might have a question repeat during the quiz, but not twice in a row.

The only draw back is in the timing. If the TS2068 in use has a Z80B microprocessor, then the computation for the first screen needs to be changed.

One of the neat things Paul did during the development of the program was to involve the kids in the expansion of the program. He had his children research the additional questions to expand the quiz from three to four questions for each category.

```

10 SOUND 8,16;9,16;10,16: LET
P=NOT PI: GO TO VAL "1750"
20 REM **** ROUTINES...STARS**
**
30 FOR N=E TO 230
40 IF INT (RND*8)+1<T THEN LET
V$=V$+"*": GO TO 60
50 LET V$=V$+" "
60 PRINT INVERSE E;AT 5,5;17-I
NT ((PEEK 23672+PEEK 23673*256)/
60): " SECONDS ": NEXT N: LET V$=
V$+V$
70 FOR N=E TO 14: PRINT AT N+E
E, PAPER 5;V$(N*29-28 TO N*29)
80 NEXT N: RETURN
90 REM ****CHANGE STARS***
100 LET N=INT (RND*400)+2
110 LET V$=V$(N+E TO )+V$( TO N
): GO TO 70
120 REM ****PRINT SCORE****
130 PRINT AT 20,E; "AT 20
,6-LEN STR$ SA;SA;"/MPH "AT 20,
12:" "AT 20,17-LEN STR$ SC;
SC;"/MPH " : RETURN
140 REM ****PRINT IDENT****
150 BEEP .1,20: PRINT AT 20,23;
"BRIDGE": RETURN
160 BEEP .1,10: PRINT AT 20,23;
" M*5 " : RETURN
170 REM ****CLS SCREEN****
180 FOR A=15 TO T STEP -E

```

```

190 PRINT AT A,E;C$: NEXT A: RE
TURN
200 REM ****SCROLL TEXT****
210 FOR N=E TO LEN A$-28: PRINT
PAPER 3;AT 9,T;A$( TO 27): BEEP
.005,.2: PAUSE 11: LET A$=A$(T
TO ) : NEXT N: RETURN
220 REM ****BAD INPUT****
230 PRINT AT 9,T: FLASH E; " INP
UT UNUSABLE, PLEASE WAIT"
240 PAUSE 30: RETURN
250 REM ****QUESTIONS****
260 PAPER 7: GO SUB 130: GO SUB
MS
270 GO SUB 100: PAUSE 90: PAPER
5: PRINT AT PI,T;"NAME THE PLAN
ET THAT:";AT 4,T;
280 LET QR=INT (RND*36)+E
290 IF QR<K THEN GO TO 280
300 LET K=QR
310 LET Q$="MERCURY"
320 IF QR>4 THEN LET Q$="VENUS"
330 IF QR>8 THEN LET Q$="EARTH"
340 IF QR>12 THEN LET Q$="MARS"
350 IF QR>16 THEN LET Q$="JUPIT
ER"
360 IF QR>20 THEN LET Q$="SATUR
N"
370 IF QR>24 THEN LET Q$="URANU
S"
380 IF QR>28 THEN LET Q$="NEPTU
NE"
390 IF QR>32 THEN LET Q$="PLUTO"
400 GO TO VAL "380+QR*30"
410 PRINT "IS 1ST";S$
420 GO TO AS
430 GO TO AS
440 PRINT L$;"88 DAYS"
450 GO TO AS
460 GO TO AS
470 PRINT "HAS A SURFACE TEMPER
ATURE OF"
480 PRINT AT 5,T;"430 DEG. C ON
THE DAY SIDE";AT 6,T;"-170 C ON
THE NIGHT SIDE"
490 GO TO AS
500 PRINT "HAS THE LONGEST DAY"
510 GO TO AS
520 GO TO AS
530 PRINT "IS 2ND";S$
540 GO TO AS
550 PRINT "IS COVERED WITH THIC
K CLOUDS";AT 5,T;"OF SULFURIC AC
ID"
560 GO TO AS
570 PRINT L$;"255 DAYS"
580 GO TO AS
590 PRINT "WAS NAMED FOR A GREE
K";AT 5,T;"GODDESS"
600 GO TO AS
610 PRINT "IS 3RD";S$
620 GO TO AS
630 PRINT "IS THE ONLY PLANET K
NOWN TO "AT 5,T;"SUPPORT LIFE"
640 GO TO AS
650 GO TO AS
660 GO TO AS
670 GO TO AS
680 GO TO AS
690 GO TO AS
700 GO TO AS

```

```

710 PRINT "IS 149,600,000 KM FR
OM THE" AT 5,T;"SUN" (APPROX. 93
MILLION" AT 6,T;"MILES)"
730 GO TO A$
740 PRINT L$;"365 DAYS"
760 GO TO A$
770 PRINT "IS 4TH";S$
790 GO TO A$
800 PRINT "IS KNOWN AS THE ""RE
D PLANET""
820 GO TO A$
830 PRINT "HAS A VARIABLE SURFA
CE" AT 5,T;"TEMPERATURE AVERAGIN
G -50" AT 6,T;"DEG. C"
850 GO TO A$
860 PRINT "HAS CANALS "
880 GO TO A$
900 PRINT "IS 5TH";S$
910 GO TO A$
930 PRINT L$;"11.86 YEARS"
940 GO TO A$
950 PRINT F$;" EUROPA "
970 GO TO A$
980 PRINT "HAS A RED SPOT"
1000 GO TO A$
1010 PRINT "IS 6TH";S$
1030 GO TO A$
1040 PRINT "IS THE 2ND LARGEST P
LANET IN" AT 5,T;"OUR SOLAR SYST
EM"
1060 GO TO A$
1070 PRINT "HAS 7 MAJOR RINGS"
1090 GO TO A$
1100 PRINT F$;"TITAN"
1120 GO TO A$
1130 PRINT "IS 7TH";S$
1150 GO TO A$
1160 PRINT "HAS 9 MAJOR RINGS"
1180 GO TO A$
1190 PRINT "HAS A TEMPERATURE OF
-215" AT 5,T;"DEG. C AT THE CLO
UD TOPS"
1210 GO TO A$
1220 PRINT L$;"84 YEARS"
1240 GO TO A$
1250 PRINT "IS 8TH";S$
1270 GO TO A$
1280 PRINT F$;" TRITON "
1300 GO TO A$
1320 PRINT L$;"165 YEARS"
1330 GO TO A$
1340 PRINT "IS THE 4TH LARGEST"
1360 GO TO A$
1370 PRINT "IS 9TH";S$
1390 GO TO A$
1400 PRINT "IS THE COLDEST"
1420 GO TO A$
1430 PRINT L$;"248 YEARS"
1450 GO TO A$
1470 PRINT F$;" CHARON "
1490 PAUSE 7: GO SUB CR
1500 INPUT " INPUT DATA ";B$
1510 PAPER 5: PRINT AT 8,6;"CREW
S ANSWER-";B$ AT 5,T;"CORRECT
ANSWER-";Q$; PAPER 7
1520 IF B$<>Q$ THEN GO TO 1540
1530 LET SA=SA-TH+T: GO SUB 130
1540 IF SA<=TH+T AND SC>TH THEN
GO TO 1590
1550 LET SC=SC-TH: GO SUB 130
1560 PAUSE SR
1570 IF SC<=TH THEN GO TO 1640
1580 IF SC>TH THEN GO TO 260
1590 PRINT AT 20,23;"DOCKING"
1600 PAUSE SR: GO SUB 170
1610 REM ****LANDING****
1620 PRINT AT PI,T;"***CONGRATUL
ATIONS***" AT 4,T;"YOU HAVE SURV
IVED THE" AT 5,T;"CRISIS. PREPAR
E FOR A SAFE" AT 6,T;"LANDING AT
MOON BASE 2 AND " AT 7,T;"ENJOY
YOUR STAY"
1630 PAUSE TH: GO TO 2150
1640 REM ****ALL-OVER****
1650 GO SUB 170
1660 PRINT AT T+R,T;"ALL HOPE IS
LOST NO ONE CAN" AT 5,T;"HELP U
S NOW" AT 5-T,T;"DISASTER PROCEE
DINGS"
1670 PRINT INK 2; AT 5-T,24; FLAS
H E;"NOW" AT PI,R,T;"DANGER"; FL
ASH NOT PI; TAB 21; FLASH E; INVE
RSE E;"DANGER"
1680 FOR N=E TO 20
1690 BEEP .15,10: BEEP .15,20: N
EXT N
1700 PRINT AT 14,S+R; FLASH E;"C
RASH"
1710 SOUND 8,15;9,16;10,16;6,25;
13,0,12,70;7,7: PAUSE 180
1730 GO TO 2150
1740 REM ****SETUP****
1750 POKE 23609,10: POKE 23658,8
: DIM C$(29): READ M$,CR$,SR$,E$,T$,
S$,TH$,F$,L$,S$,R$,SA,SC,K,A$

```

```

1760 DATA VAL "160",VAL "150",VA
L "210",SGN PI,VAL "2",VAL "10",
VAL "1000","has a moon named ",
has a orbit of "," in line from
the sun",INT PI,VAL "18e3",sa,NO
T PI,VAL "1490"
1770 CLS : REM ****PLOT SCREEN**
***
1780 PRINT "
1790 FOR A=E TO 14
1800 PRINT " "; PAPER NOT PI;C$;
PRINT " "; NEXT A
1810 PRINT "
1820 PRINT TAB 3;"MAIN SCREEN"
SPEED(AC) SPEED(CAL) CONTROL"
1830 PLOT 4,20: DRAW 236,NOT PI:
DRAW NOT PI,-16: DRAW -236,NOT
PI: DRAW NOT PI,16: PLOT 92,20:
DRAW NOT PI,-16: PLOT 180,4: DRA
W NOT PI,16
1840 IF P THEN GO TO 260
1850 PRINT AT 20,E;"WARP-DRIVE";
AT 20,S+T;"WARP-DRIVE": GO SUB M
$
1860 PRINT AT PI,T; INVERSE E;"M
*5 HERE-PREPARE TO LEAVE" AT 4,T
;"WARP-DRIVE. NORMAL SPACE" AT 5
,T;"IN "
1870 LET U$="": POKE 23672,NOT P
I: POKE 23673,NOT PI: GO SUB 20
1880 PAUSE VAL "333"
1890 LET A$=C$+"M*5 HERE-WE HAVE
EMERGED FROM WARP-DRIVE AND ARE
NOW MOVING AT SUB-LIGHT SPEED;
18000/MPH. WE ARE NEARING OUR SO
LAR SYSTEM."
1900 LET A$=A$+" I WILL CONTROL
THE SHIP'S DEACCELERATION TO DOO
KING APPROACH FOR MOON BASE 2."
1910 GO SUB 130: GO SUB M$
1920 LET A$=A$+" I WILL DISENGAG
E AT 2000/MPH TO LET THE DOCKING
COMPUTER HAVE CONTROL OF OUR SH
IP. OUR ETA IS--AWK!MARY HAD A?
?1+1=3//BLURP SORRY ABOUT THAT!"
1930 GO SUB SR
1940 PAUSE SR: GO SUB CR
1950 LET A$=C$+"CAPTAIN HOOK HER
E, SCIENCE OFFICER SPECK REPORTS
A CHECK OF YOUR TROUBLE SHOWS M
AJOR DATA LOSS ABOUT OUR SOLAR S
YSTEM. YOU NEED ALL DATA RE-INPUT
TED"
1960 GO SUB SR
1970 PAUSE SR: GO SUB M$
1980 LET A$=C$+"CAN THE CREW HEL
P ME?
1990 GO SUB SR
2000 PAUSE SR: GO SUB CR
2010 LET A$=C$+"OF COURSE, WE CA
N, AND IF THE ANSWERS ARE CORREC
T YOU CAN CONTROL THE SHIP."
2020 GO SUB SR
2030 PAUSE SR: GO SUB M$
2040 LET A$=C$+"THANK YOU CAPTIA
N, WITH EACH CORRECT ANSWER I CA
N REDUCE SHIP'S SPEED BY 2000 MP
H. WE MUST REDUCE SHIP'S SPEED T
O 2000 MPH BEFORE THE CALCULATED
SPEED REACHES 1000 MPH OR WE WI
LL CRASH."
2050 LET A$=A$+" QUESTIONS ARE A
NSWERED BY ENTERING A PLANET NAM
E."
2060 GO SUB SR
2070 PAUSE SR: LET A$=C$+"IS THE
CREW READY? (Y OR N)"
2080 GO SUB SR
2090 GO SUB CR
2100 INPUT B$: IF B$="" THEN GO
TO 2130
2110 IF B$(E)="Y" THEN GO TO 260
2120 IF B$(E)="N" THEN GO TO 164
0
2130 GO SUB 220: GO TO 2070
2140 GO SUB 170: REM ****REPLAY*
***
2150 INPUT "Do you wish to play
again (Y/N)?" ;A$
2160 IF A$(E)="Y" THEN LET P=E:
RESTORE : GO TO 1750
2170 IF A$(E)="N" THEN CLS: PRI
NT AT 5+T,S+T;"GOODBY": PAUSE 12
0: NEW
2180 GO SUB 220: GO TO 2150
2190 SAVE "M*5" LINE PI

```


MULT STEPS

BEST
TS1000

by Alex Sweitzer

MULTSTEPS is a multiplication tutor written for the TS1000/1500 by Alex Sweitzer of Fayette City, PA. The program epitomizes how computers can be used as teaching tools in the classroom or on the job. The program takes the student step-by-step through the process of multiplying a three digit by two digit number, gently correcting the student as needed. Included is a neat "reward" sequence at the end of the session for a job well done.

The lines that follow are from listing 1 and have inverse graphics contained in them. In order to eliminate any confusion, we are listing them here with an explanation of the graphic characters.

```

50  graphic 6's
80  DIRECTIONS and GOOD LUCK
120 INITIATE VARIABLES
130 EXAMPLE
170 graphic 6's
230 YOUR PROBLEM
270 graphic 6's
300 MULT. STEPS
330 1
520 2
730 3
840 4
910 5
1000 6
1180 7
1370 8
1480 9
1560 10
1590 graphic 6's
1640 11
1700 12
1780 13
1860 14
1940 15
2020 PRODUCT OF 5 DIGITS
2030 12
2110 13
2190 14
2270 15
2350 16
2600 both are inverse ? marks
2650 and 2700 are the same as 2600
2780 ENDING SCREEN
2860 MULTIPLICATION PROBLEM COMPLETED
    
```

```

2940 STEP:
3090 ONLY ONE DIGIT PLEASE...
3130 INTRO SCREEN
    
```

Lines 3340 thru 3450: The words PRACTICE WITH. A different letter is show in inverse graphics each line.

Lines 3480 thru 3610: One letter of the word MULTIPLICATION on each line show in inverse graphics.

```

3700 I AM FALLING FOR MATH.
3740 HERE I GO
3830 END OF PARA
3850 OUCH
3900 AGAIN
3930 graphic 7's
3940 graphic W, graphic G's, graphic Q
3990 graphic G
4000 graphic F
4020 graphic 2's
    
```

```

@REM BY ALEX R. SWEITZER
R.D. 1 BOX 207
FAYETTE CITY, PA. 15438
10 GOSUB 3140
20 RAND
30 CLS
40 PRINT AT 2,5;"MULTIPLICATIO
N STEPS"
50 PRINT AT 3,5;"
60 PRINT AT 14,10;"BY MR. A. S
WEITZER"
70 GOSUB 3020
80 PRINT AT 10,0;"DIRECTIONS
PLEASE FOLLOW THE
ON THE BOTTOM OF THE
AT ALL TIMES. GOOD LUCK"
90 GOSUB 3020
100 CLS
110 SLOW
120 REM INITIATE VARIABLES
130 PRINT AT 0,20;"EXAMPLE"
140 PRINT AT 3,20;"- - - - -"
150 PRINT AT 4,20;"X"
160 PRINT AT 4,20;"- - - - -"
170 PRINT AT 5,20;"
180 LET A=INT (RAND*9)+1
190 LET B=INT (RAND*9)+1
200 LET X=INT (RAND*9)+1
210 LET Y=INT (RAND*9)+1
220 LET Z=INT (RAND*9)+1
230 PRINT AT 0,2;"YOUR PROBLEM"
240 PRINT AT 3,8;X;Y;Z
250 PRINT AT 4,5;"X"
    
```

```

260 PRINT AT 4,9;B;A
270 PRINT AT 5,5; " "
280 LET Q=Z+(Y*10)+(X*100)
290 LET W=A+(B*10)
300 REM MULTIPLY STEPS
310 GOSUB 2430
320 GOSUB 2940
330 PRINT "1. MULTIPLY ";A;" TI
MES ";Z
340 GOSUB 2960
350 LET T=A*Z
360 LET T$=STR$ T
370 IF R<>T THEN PRINT "NO, PRO
DUCT IS:";T
380 IF R<>T THEN GOSUB 2960
390 IF LEN T$=1 THEN PRINT AT 6
,10;T$
400 IF LEN T$=1 THEN LET K=0
410 IF LEN T$=1 THEN GOTO 470
420 IF LEN T$>1 THEN LET C$=T$(
1 TO 1)
430 IF LEN T$>1 THEN LET K$=T$(
1 TO 1)
440 LET K=VAL K$
450 PRINT AT 2,9;C$
460 IF LEN T$>1 THEN PRINT AT 6
,10;T$(LEN T$-1+1 TO LEN T$)
470 GOSUB 3020
480 GOSUB 2480
490 GOSUB 2940
500 IF K=0 THEN LET K$="0"
510 LET K=VAL K$
520 PRINT "2. MULTIPLY ";A;" TI
MES ";Y;" + ";K$
530 GOSUB 2960
540 LET K=VAL T$(1 TO 1)
550 LET T=(A*Y)+VAL K$
560 LET T$=STR$ T
570 IF R<>T THEN PRINT "NO, PRO
DUCT IS:";T
580 IF R<>T THEN GOSUB 2960
590 IF LEN T$=1 THEN PRINT AT 6
,9;T$
600 IF LEN T$<2 THEN LET K=0
610 IF LEN T$=1 THEN LET K$="0"
620 IF LEN T$=1 THEN GOTO 690
630 IF LEN T$>1 THEN LET C$=T$(
1 TO 1)
640 LET K$=T$(1 TO 1)
650 IF K=0 THEN LET K$="0"
660 PRINT AT 2,8;C$
670 IF LEN T$>1 THEN LET C$=T$(
LEN T$-1+1 TO LEN T$)
680 PRINT AT 6,9;C$
690 GOSUB 3020
700 GOSUB 2530
710 GOSUB 2940
720 LET K=VAL K$
730 PRINT "3. MULTIPLY ";A;" TI
MES ";X;" + ";K
740 GOSUB 2960
750 LET T=(A*X)+K
760 LET T$=STR$ T
770 IF R<>T THEN PRINT "NO, PRO
DUCT IS:";T
780 IF R<>T THEN GOSUB 2960
790 IF LEN T$=1 THEN PRINT AT 6
,8;T$
800 IF LEN T$=1 THEN GOTO 820
810 IF LEN T$>1 THEN PRINT AT 6
,7;T$
820 GOSUB 3020
830 GOSUB 2940
840 PRINT "4. PRESS <E> TO ERAS
E ANY AND " , , , "ALL NUMBERS YOU C
ARRIED."
850 PRINT AT 18,0;"ENTER <E> TO
ERASE."
860 INPUT E$
870 IF E$="E" THEN PRINT AT 2,0
, "
880 IF E$="E" THEN GOTO 900
890 GOTO 860
900 GOSUB 2940
910 PRINT "5. PRESS <Z> TO PLAC
E YOUR ZERO" , , , "IN THE ONES COLU
MN."
920 PRINT AT 18,0;"ENTER <Z> FO
R ZERO."
930 INPUT Z$
940 IF Z$="Z" THEN PRINT AT 7,1
0;"0"
950 IF Z$="Z" THEN GOTO 970
960 GOTO 930
970 GOSUB 3020
980 GOSUB 2580
990 GOSUB 2940
1000 PRINT "6. MULTIPLY ";B;" TI
MES ";Z
1010 GOSUB 2960
1020 LET T=(B*Z)
1030 LET T$=STR$ T
1040 IF R<>T THEN PRINT "NO, PRO
DUCT IS:";T

```

```

1050 IF R<>T THEN GOSUB 2960
1060 IF LEN T$=1 THEN PRINT AT 7
,9;T$
1070 IF LEN T$=1 THEN LET K$="0"
1080 IF LEN T$=1 THEN GOTO 1140
1090 IF LEN T$>1 THEN LET C$=T$(
1 TO 1)
1100 LET K$=C$
1110 PRINT AT 2,9;C$
1120 IF LEN T$>1 THEN LET C$=T$(
LEN T$-1+1 TO LEN T$)
1130 PRINT AT 7,9;C$
1140 GOSUB 3020
1150 GOSUB 2630
1160 GOSUB 2940
1170 LET K=VAL K$
1180 PRINT "7. MULTIPLY ";B;" TI
MES ";Y;" + ";K
1190 GOSUB 2960
1200 LET T=(B*Y)+K
1210 LET T$=STR$ T
1220 IF R<>T THEN PRINT "NO, PRO
DUCT IS:";T
1230 IF R<>T THEN GOSUB 2960
1240 IF LEN T$=1 THEN PRINT AT 7
,8;T$
1250 IF LEN T$=1 THEN LET K=0
1260 IF LEN T$=1 THEN LET K$="0"
1270 IF LEN T$=1 THEN GOTO 1330
1280 IF LEN T$>1 THEN LET C$=T$(
1 TO 1)
1290 IF LEN T$>1 THEN LET K$=C$
1300 PRINT AT 2,8;C$
1310 IF LEN T$>1 THEN LET C$=T$(
LEN T$-1+1 TO LEN T$)
1320 PRINT AT 7,8;C$
1330 GOSUB 3020
1340 GOSUB 2680
1350 GOSUB 2940
1360 LET K=VAL K$
1370 PRINT "8. MULTIPLY ";B;" TI
MES ";X;" + ";K
1380 GOSUB 2960
1390 LET T=(B*X)+K
1400 LET T$=STR$ T
1410 IF R<>T THEN PRINT "NO, PRO
DUCT IS:";T
1420 IF R<>T THEN GOSUB 2960
1430 IF LEN T$=1 THEN PRINT AT 7
,7;T$
1440 IF LEN T$=1 THEN GOTO 1460
1450 IF LEN T$>1 THEN PRINT AT 7
,6;T$
1460 GOSUB 3020
1470 GOSUB 2940
1480 PRINT "9. PRESS <P> TO PLAC
E YOUR PLUS" , , , "SIGN (+) CORRECT
LY."
1490 PRINT AT 18,0;"ENTER <P> FO
R PLUS SIGN (+)."
1500 INPUT P$
1510 IF P$="P" THEN PRINT AT 7,4
, "+"
1520 IF P$="P" THEN GOTO 1540
1530 GOTO 1500
1540 GOSUB 2730
1550 GOSUB 2940
1560 PRINT "10. PRESS <L> TO DRA
W YOUR LINE."
1570 PRINT AT 18,0;"PRESS <L> FO
R LINE."
1580 INPUT L$
1590 IF L$="L" THEN PRINT AT 8,5
, "
1600 IF L$="L" THEN GOTO 1620
1610 GOTO 1580
1620 GOSUB 2730
1630 GOSUB 2940
1640 PRINT "11. ADD EACH COLUMN
CAREFULLY. I WILL ASK FOR ONLY ON
E DIGIT AT A TIME STARTING AT THE
COLUMN ON THE RIGHT."
1650 GOSUB 3020
1660 GOSUB 2940
1670 LET Y=0+U
1680 LET Y$=STR$ Y
1690 IF LEN Y$>4 THEN GOTO 2020
1700 PRINT "12. ENTER ""ONE""S""
DIGIT."
1710 INPUT U$
1720 GOSUB 3090
1730 IF U$<>Y$(4 TO 4+1-1) THEN
PRINT "NO, DIGIT IS:";Y$(4 TO 4+
1-1)
1740 IF U$<>Y$(4 TO 4+1-1) THEN
GOTO 1710
1750 IF U$=Y$(4 TO 4+1-1) THEN P
RINT AT 9,10;U$
1760 GOSUB 3020
1770 GOSUB 2940
1780 PRINT "13. ENTER ""TEN""S""
DIGIT."
1790 INPUT U$
1800 GOSUB 3090

```



```

1810 IF U$<>Y$(3 TO 3+1-1) THEN
PRINT "NO, DIGIT IS:";Y$(3 TO 3+
1-1)
1820 IF U$<>Y$(3 TO 3+1-1) THEN
GOTO 1790
1830 IF U$=Y$(3 TO 3+1-1) THEN P
RINT AT 9,9;U$
1840 GOSUB 3020
1850 GOSUB 2940
1860 PRINT "3. ENTER ""HUNDRED *
3"" DIGIT."
1870 INPUT U$
1880 GOSUB 3090
1890 IF U$<>Y$(2 TO 2+1-1) THEN
PRINT "NO, DIGIT IS:";Y$(2 TO 2+
1-1)
1900 IF U$<>Y$(2 TO 2+1-1) THEN
GOTO 1870
1910 IF U$=Y$(2 TO 2+1-1) THEN P
RINT AT 9,8;U$
1920 GOSUB 3020
1930 GOSUB 2940
1940 PRINT "4. ENTER ""THOUSAND
*4"" DIGIT."
1950 INPUT U$
1960 GOSUB 3090
1970 IF U$<>Y$(1 TO 1+1-1) THEN
PRINT "NO, DIGIT IS:";Y$(1 TO 1+
1-1)
1980 IF U$<>Y$(1 TO 1+1-1) THEN
GOTO 1950
1990 IF U$=Y$(1 TO 1+1-1) THEN P
RINT AT 9,7;U$
2000 GOSUB 3020
2010 GOTO 2780
2020 REM PRODUCT OF 5 DIGITS
2030 PRINT "5. ENTER ""ONE *5""
DIGIT."
2040 INPUT U$
2050 GOSUB 3090
2060 IF U$<>Y$(5 TO 5+1-1) THEN
PRINT "NO, DIGIT IS:";Y$(5 TO 5+
1-1)
2070 IF U$<>Y$(5 TO 5+1-1) THEN
GOTO 2040
2080 IF U$=Y$(5 TO 5+1-1) THEN P
RINT AT 9,10;U$
2090 GOSUB 3020
2100 GOSUB 2940
2110 PRINT "6. ENTER ""TEN *5""
DIGIT."
2120 INPUT U$
2130 GOSUB 3090
2140 IF U$<>Y$(4 TO 4+1-1) THEN
PRINT "NO, DIGIT IS:";Y$(4 TO 4+
1-1)
2150 IF U$<>Y$(4 TO 4+1-1) THEN
GOTO 2120
2160 IF U$=Y$(4 TO 4+1-1) THEN P
RINT AT 9,9;U$
2170 GOSUB 3020
2180 GOSUB 2940
2190 PRINT "7. ENTER ""HUNDRED *
3"" DIGIT."
2200 INPUT U$
2210 GOSUB 3090
2220 IF U$<>Y$(3 TO 3+1-1) THEN
PRINT "NO, DIGIT IS:";Y$(3 TO 3+
1-1)
2230 IF U$<>Y$(3 TO 3+1-1) THEN
GOTO 2200
2240 IF U$=Y$(3 TO 3+1-1) THEN P
RINT AT 9,8;U$
2250 GOSUB 3020
2260 GOSUB 2940
2270 PRINT "8. ENTER ""THOUSAND
*4"" DIGIT."
2280 INPUT U$
2290 GOSUB 3090
2300 IF U$<>Y$(2 TO 2+1-1) THEN
PRINT "NO, DIGIT IS:";Y$(2 TO 2+
1-1)
2310 IF U$<>Y$(2 TO 2+1-1) THEN
GOTO 2280
2320 IF U$=Y$(2 TO 2+1-1) THEN P
RINT AT 9,7;U$
2330 GOSUB 3020
2340 GOSUB 2940
2350 PRINT "9. ENTER ""TEN-THOU
SAND *5"" DIGIT."
2360 INPUT U$
2370 GOSUB 3090
2380 IF U$<>Y$(1 TO 1+1-1) THEN
PRINT "NO, DIGIT IS:";Y$(1 TO 1+
1-1)
2390 IF U$<>Y$(1 TO 1+1-1) THEN
GOTO 2360
2400 IF U$=Y$(1 TO 1+1-1) THEN P
RINT AT 9,6;U$
2410 GOSUB 3020
2420 GOTO 2780
2430 FOR J=1 TO 9
2440 PRINT AT 3,27;"*";AT 4,27;"
*";
2450 PRINT AT 3,27;"?";AT 4,27;"
?";
2460 NEXT J

```

```

2470 RETURN
2480 FOR J=1 TO 9
2490 PRINT AT 3,26;"*";AT 4,27;"
*";
2500 PRINT AT 3,26;"?";AT 4,27;"
?";
2510 NEXT J
2520 RETURN
2530 FOR J=1 TO 9
2540 PRINT AT 3,25;"*";AT 4,27;"
*";
2550 PRINT AT 3,25;"?";AT 4,27;"
?";
2560 NEXT J
2570 RETURN
2580 FOR J=1 TO 9
2590 PRINT AT 3,27;"*";AT 4,26;"
*";
2600 PRINT AT 3,27;"?";AT 4,26;"
?";
2610 NEXT J
2620 RETURN
2630 FOR J=1 TO 9
2640 PRINT AT 3,26;"*";AT 4,26;"
*";
2650 PRINT AT 3,26;"?";AT 4,26;"
?";
2660 NEXT J
2670 RETURN
2680 FOR J=1 TO 9
2690 PRINT AT 3,25;"*";AT 4,26;"
*";
2700 PRINT AT 3,25;"?";AT 4,26;"
?";
2710 NEXT J
2720 RETURN
2730 PRINT AT 11,0;
2740 FOR J=1 TO 11
2750 PRINT "
"
2760 NEXT J
2770 RETURN
2780 REM ENDING SCREEN
2790 PRINT AT 21,1;"<P>= COPY OR
<C>= CONTINUE"
2800 IF INKEY$="" THEN GOTO 2800
2810 IF INKEY$="P" THEN PRINT AT
21,0;"
"
2820 IF INKEY$="P" THEN COPY
2830 IF INKEY$="C" THEN GOTO 284
0
2840 PRINT AT 12,0;
2850 FOR J=1 TO 8
2860 PRINT "MULTIPLICATION PROBL
EM COMPLETED"
2870 NEXT J
2880 FOR X=1 TO 10
2890 PRINT AT 11,0;"
"
2900 NEXT X
2910 CLS
2920 GOTO 3660
2930 STOP
2940 PRINT AT 12,0;"STEP:";AT 14
,0;
2950 RETURN
2960 PRINT AT 18,0;"ENTER PRODUC
T:"
2970 INPUT R
2980 PRINT AT 18,16;R
2990 LET R$=STR$ R
3000 RETURN
3010 STOP
3020 PRINT AT 21,2;"PRESS ANY KE
Y TO CONTINUE."
3030 PAUSE 4E4
3040 PRINT AT 11,0;
3050 FOR J=1 TO 11
3060 PRINT "
"
3070 NEXT J
3080 RETURN
3090 IF LEN U$>1 THEN PRINT "
ONLY ONE DIGIT PLEASE..."
3100 IF LEN U$>1 THEN PAUSE 100
3110 RETURN
3120 STOP
3130 REM INTRO SCREEN
3140 LET A=12
3150 LET Z=8
3160 CLS
3170 FOR X=15 TO 45
3180 PLOT X,35
3190 NEXT X
3200 GOTO 3280
3210 FOR X=45 TO 15 STEP -1
3220 PLOT X,30
3230 NEXT X
3240 FOR X=30 TO 35
3250 PLOT 14,X
3260 NEXT X
3270 GOTO 3320
3280 FOR X=35 TO 30 STEP -1
3290 PLOT 45,X
3300 NEXT X
3310 GOTO 3210

```

```

3320 FOR X=1 TO 14
3330 PRINT AT 5,8;"PRACTICE WITH
3340 PRINT AT 5,8;"PRACTICE"
3350 PRINT AT 5,8;"PRACTICE"
3360 PRINT AT 5,8;"PRACTICE"
3370 PRINT AT 5,8;"PRACTICE"
3380 PRINT AT 5,8;"PRACTICE"
3390 PRINT AT 5,8;"PRACTICE"
3400 PRINT AT 5,8;"PRACTICE"
3410 PRINT AT 5,8;"PRACTICE"
3420 PRINT AT 5,8;"PRACTICE WITH
3430 PRINT AT 5,8;"PRACTICE WITH
3440 PRINT AT 5,8;"PRACTICE WITH
3450 PRINT AT 5,8;"PRACTICE WITH
3460 PRINT AT 5,8;"PRACTICE WITH
3470 PRINT AT 5,8;"PRACTICE WITH
3480 IF X=1 THEN PRINT AT A,Z;"1"
3490 IF X=2 THEN PRINT AT A,Z;"2"
3500 IF X=3 THEN PRINT AT A,Z;"3"
3510 IF X=4 THEN PRINT AT A,Z;"4"
3520 IF X=5 THEN PRINT AT A,Z;"5"
3530 IF X=6 THEN PRINT AT A,Z;"6"
3540 IF X=7 THEN PRINT AT A,Z;"7"
3550 IF X=8 THEN PRINT AT A,Z;"8"
3560 IF X=9 THEN PRINT AT A,Z;"9"
3570 IF X=10 THEN PRINT AT A,Z;"10"
3580 IF X=11 THEN PRINT AT A,Z;"11"
3590 IF X=12 THEN PRINT AT A,Z;"12"
3600 IF X=13 THEN PRINT AT A,Z;"13"
3610 IF X=14 THEN PRINT AT A,Z;"14"
3620 LET Z=Z+1
3630 NEXT X

```

```

3640 PAUSE 100
3650 RETURN
3660 FOR X=1 TO 31
3670 LET A=X
3680 GOTO 3930
3690 PRINT AT A-1,X;"
3700 IF X=2 THEN PRINT AT 31,0;"
3710 IF A=11 AND X=11 THEN GOTO
3720 IF A=11 AND X=11 THEN GOTO
3730 NEXT X
3740 PRINT AT 16,4;"HERE I GO..."
3750 FOR X=1 TO 22
3760 SCROLL
3770 FOR M=1 TO 3
3780 NEXT M
3790 NEXT X
3800 SLOW
3810 FAST
3820 RUN 100
3830 REM END OF PARA
3840 FOR O=1 TO 12
3850 PRINT AT 16,18;"...OUCH"
3860 PRINT AT 16,18;"...OUCH"
3870 NEXT O
3880 FOR K=1 TO 10
3890 NEXT K
3900 PRINT AT 16,17;"...AGAIN"
3910 PRINT AT 21,0;"
3920 GOTO 3720
3930 PRINT AT A,X;"
3940 PRINT AT A+1,X;"
3950 PRINT AT A+2,X;"
3960 PRINT AT A+3,X;"
3970 PRINT AT A+4,X;"
3980 PRINT AT A+5,X;"
3990 PRINT AT A+6,X;"
4000 PRINT AT A+7,X;"
4010 PRINT AT A+8,X;"
4020 PRINT AT A+9,X;"
4030 GOTO 3690
4040 SAVE "MULTSTEP"
4050 RUN

```

PROGRAM: MULTSTEPS
LISTING 1

Yet Another ZX-TS Fix

Fred Nachbaur

Do you have any of the following problems with your ZX81 or TS1000?

- 1: "Built-in NVM" of SWN 4:1 does not properly run WRX16 hi-res.
- 2: Certain keyboard lines go dead after installing a large keyboard, joystick plug, etc.
- 3: Erratic operation when adding certain peripherals, even though you KNOW you have an adequate power supply.
- 4: The TS2040 printer gives your system a fit.

If the answer to any of the above is "yes," take heart. We've found yet another design oddity in the ZX81. Correcting it is almost ridiculously easy; no parts need to be added, and no circuit board traces need to be cut. You only have to clip out a few resistors!

The ZX81/TS1000 has "pullup" resistors on the CPU data lines. Presumably, these were included to help give more drive. In the most basic systems (16K RAM only), these help to insure that logic HIGH is indeed high. However, most add-ons have a tendency to pull the data lines high anyway; in this case, it can happen that the data line voltage is pulled too high to give a reliable logic LOW. This especially

shows up when running WRX16 hi-res based programs; some systems will give nothing but a black screen, others will have pixels that randomly flash on and off.

I realize that some folks may object, on the principle that "if the resistors weren't needed, Timex wouldn't have included them." All I can say is that on the five different machines we've done this with, ALL showed superior performance after the surgery, ALL run WRX16 without a hitch, and NONE have showed any adverse "post-op reactions."

These eight resistors are located between the heatsink and the large keyboard tail, at the front of the board. They are arranged in two banks of four 10K resistors each. All you need to do is to clip one end of each of these resistors, and bend them up so that there is no possibility of contact. Note that these are 10K (brown-black-orange-gold). DO NOT clip the 470 ohm resistors that are nearby (yellow-purple-brown-gold).

Interestingly, the design used in the Larken / Silicon Mountain SCRAM board seems more immune to problems than the "built-in NVM." Still, it is conceivable that even this device will have trouble with some systems unless the data line pullups are disconnected.

ANIMALSLLL



BEST TS2068 by Larry Liedtke

ANIMALSLLL by Larry Liedtke is our first place winner in the TS2068 category. The original submission contained 327 different animals with 15 questions being asked about each. This amounted to over 11,000 possible answers.

We've shortened the animal list somewhat to only one per category to save space (the original 2040 listing was almost 20 feet long!). But you can easily see how the data is entered for each critter you would like to include.

To clear up any confusion that might result when the listing is printed, below is the text that appears in inverse graphics.

```

146 NO I DON'T HAVE VISION
148 YES I DO HAVE VISION!!
156 NO I DON'T HAVE HEARING
158 YES I DO HAVE HEARING!!
166 NO I DON'T HAVE A NOSE
168 YES I DO HAVE A NOSE!!
176 NO I DON'T HAVE HANDS
178 YES I DO HAVE HANDS!!
186 NO I DON'T HAVE FEET
188 YES I DO HAVE FEET!!
196 NO I DON'T HAVE A LOT OF HAIR
198 YES I DO HAVE A LOT OF HAIR!!
206 NO I DON'T HAVE FEATHERS
208 YES I DO HAVE FEATHERS!!
216 NO I DON'T HAVE FINS
218 YES I DO HAVE FINS!!
226 NO I DON'T HAVE WINGS
228 YES I DO HAVE WINGS!!
236 NO I DON'T HAVE SCALES
238 YES I DO HAVE SCALES!!
246 NO I DON'T HAVE BIG CLAWS
248 YES I DO HAVE BIG CLAWS!!
256 NO I DON'T HAVE BIG TEETH
258 YES I DO HAVE BIG TEETH!!
266 NO I DON'T HAVE A TAIL
268 YES I DO HAVE A TAIL!!
276 NO I DON'T HAVE A SHELL
278 YES I DO HAVE A SHELL!!
495 BYE SEE YOU LATER
9590 HAVE FUN !!
9600 ENTER
9620 CLUES
9630 NOSES
9640 CLAWS
9670 ENTER
    
```

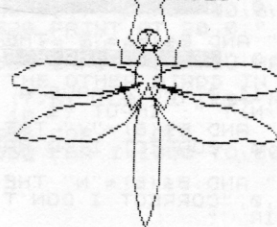
Enter the data for the different animals in program statements randomly from 1005 to 4270. As you can see from the lines in that area in our listing, there isn't much to it.

1. Randomly select a line number from 1005 to 4270 that is not in use.
2. As the first statement in the line...
LET A\$="animal_name":
3. As the next statement, set up B\$ to provide the correct answers to the 15 questions. Each of the questions, Do I have vision, Do I have hearing, etc., are answered by a corresponding Y for yes or N for no in B\$.
4. As the next statement in the selected line number, set C\$ equal to the letter of the category of the animal, ie., M for mammal, B for bird, etc.
5. Finally place a RETURN statement at the end of the line.

The program selects an animal by randomly generating a number from 1005 to 4270, executing a GOSUB to that number, and setting A\$, B\$, and C\$ accordingly. If the generated line number does not exist, Sinclair BASIC just goes to the next available one that does occur in the listing (something IBM BASIC won't do!!!).

This is a very loooong listing. The original program was something like 37K long. Tom Woods feels that Larry should get an award just for his diligence and patience typing the thing into his computer. Because of its length, Larry has offered to supply anyone who asks a complete program (all 327 animals included) for only \$5 and a blank cassette or disk (AERCO format only). Send to Larry Liedtke, 450 S. Guam St., Ridgecrest, CA 93555.

CLASS INSECT



```

8 GO TO 9500
1000 RANDOMIZE 0: POKE 23558,8
1001 SUB=1000+INT (3271*AND)
1002 SUB SUB: GO SUB 500
1003 INK 1: PRINT AT 0,0;"MY NAM
1004 A$
1005 INK 2: PRINT AT 2,0;"WHAT A
1006 ? INSECT(I), BIRD(B), FISH(F
1007 MAMMAL(M), MOLLUSK(K), CRUSTA
1008 CEAN(C), OR REPTILE(R)?"
1009 INK 3: INPUT Y$ GO SUB 600
1010 IF Y$<>"C" THEN PRINT AT 6,0;"I
1011 AM NOT A C$ - TRY AGAIN
1012 GO TO 120
1013 IF Y$="M" THEN BORDER 0
1014 IF Y$="I" THEN BORDER 1
1015 IF Y$="B" THEN BORDER 2
1016 IF Y$="F" THEN BORDER 3
1017 IF Y$="K" THEN BORDER 4
1018 IF Y$="C" THEN BORDER 5
1019 IF Y$="R" THEN BORDER 6
1020 PRINT AT 2,0;"YES I AM "D$

```

```

140 INK 0: PRINT AT 6,0;"DO I H
AVE VISION(Y/N)? " : IN
PUT Y$
142 IF Y$="Y" AND B$(1)="Y" THE
N PRINT AT 6,0;"CORRECT I DO HA
VE VISION
144 IF Y$="N" AND B$(1)="N" THE
N PRINT AT 6,0;"CORRECT I DON'T
HAVE VISION
146 IF Y$="Y" AND B$(1)="N" THE
N PRINT AT 6,0;"NO I DON'T HAVE
VISION
148 IF Y$="N" AND B$(1)="Y" THE
N PRINT AT 6,0;"YES I DO HAVE VI
SION
150 PRINT AT 7,0;"DO I HAVE HEA
RING(Y/N)? " : INPUT Y$
152 IF Y$="Y" AND B$(2)="Y" THE
N PRINT AT 7,0;"CORRECT I DO HA
VE HEARING
154 IF Y$="N" AND B$(2)="N" THE
N PRINT AT 7,0;"CORRECT I DON'T
HAVE HEARING
156 IF Y$="Y" AND B$(2)="N" THE
N PRINT AT 7,0;"NO I DON'T HAVE
HEARING
158 IF Y$="N" AND B$(2)="Y" THE
N PRINT AT 7,0;"YES I DO HAVE HE
ARING
160 PRINT AT 8,0;"DO I HAVE A N
OSE(Y/N)? " : INPUT Y$
162 IF Y$="Y" AND B$(3)="Y" THE
N PRINT AT 8,0;"CORRECT I DO HA
VE A NOSE
164 IF Y$="N" AND B$(3)="N" THE
N PRINT AT 8,0;"CORRECT I DON'T
HAVE A NOSE
166 IF Y$="Y" AND B$(3)="N" THE
N PRINT AT 8,0;"NO I DON'T HAVE
A NOSE
168 IF Y$="N" AND B$(3)="Y" THE
N PRINT AT 8,0;"YES I DO HAVE A
NOSE
170 PRINT AT 9,0;"DO I HAVE HAN
DS(Y/N)? " : INPUT Y$
172 IF Y$="Y" AND B$(4)="Y" THE
N PRINT AT 9,0;"CORRECT I DO HA
VE HANDS
174 IF Y$="N" AND B$(4)="N" THE
N PRINT AT 9,0;"CORRECT I DON'T
HAVE HANDS
176 IF Y$="Y" AND B$(4)="N" THE
N PRINT AT 9,0;"NO I DON'T HAVE
HANDS
178 IF Y$="N" AND B$(4)="Y" THE
N PRINT AT 9,0;"YES I DO HAVE HA
ND
180 PRINT AT 10,0;"DO I HAVE FE
ET(Y/N)? " : INPUT Y$
182 IF Y$="Y" AND B$(5)="Y" THE
N PRINT AT 10,0;"CORRECT I DO HA
VE FEET
184 IF Y$="N" AND B$(5)="N" THE
N PRINT AT 10,0;"CORRECT I DON'T
HAVE FEET
186 IF Y$="Y" AND B$(5)="N" THE
N PRINT AT 10,0;"NO I DON'T HAVE
FEET
188 IF Y$="N" AND B$(5)="Y" THE
N PRINT AT 10,0;"YES I DO HAVE F
EET
190 PRINT AT 11,0;"DO I HAVE A
LOT OF HAIR(Y/N)? " : INPUT Y$
192 IF Y$="Y" AND B$(6)="Y" THE
N PRINT AT 11,0;"CORRECT I DO HA
VE MUCH HAIR
194 IF Y$="N" AND B$(6)="N" THE
N PRINT AT 11,0;"CORRECT I DON'T
HAVE MUCH HAIR

```

```

196 IF Y$="Y" AND B$(6)="N" THE
N PRINT AT 11,0;"NO I DON'T HAVE
A LOT OF HAIR
198 IF Y$="N" AND B$(6)="Y" THE
N PRINT AT 11,0;"YES I DO HAVE A
LOT OF HAIR
200 PRINT AT 12,0;"DO I HAVE FE
ATHERS(Y/N)? " : INPUT Y$
202 IF Y$="Y" AND B$(7)="Y" THE
N PRINT AT 12,0;"CORRECT I DO HA
VE FEATHERS
204 IF Y$="N" AND B$(7)="N" THE
N PRINT AT 12,0;"CORRECT I DON'T
HAVE FEATHERS
206 IF Y$="Y" AND B$(7)="N" THE
N PRINT AT 12,0;"NO I DON'T HAVE
FEATHERS
208 IF Y$="N" AND B$(7)="Y" THE
N PRINT AT 12,0;"YES I DO HAVE F
EATHERS
210 PRINT AT 13,0;"DO I HAVE FI
NS(Y/N)? " : INPUT Y$
212 IF Y$="Y" AND B$(8)="Y" THE
N PRINT AT 13,0;"CORRECT I DO HA
VE FINS
214 IF Y$="N" AND B$(8)="N" THE
N PRINT AT 13,0;"CORRECT I DON'T
HAVE FINS
216 IF Y$="Y" AND B$(8)="N" THE
N PRINT AT 13,0;"NO I DON'T HAVE
FINS
218 IF Y$="N" AND B$(8)="Y" THE
N PRINT AT 13,0;"YES I DO HAVE F
INS
220 PRINT AT 14,0;"DO I HAVE WI
NGS(Y/N)? " : INPUT Y$
222 IF Y$="Y" AND B$(9)="Y" THE
N PRINT AT 14,0;"CORRECT I DO HA
VE WINGS
224 IF Y$="N" AND B$(9)="N" THE
N PRINT AT 14,0;"CORRECT I DON'T
HAVE WINGS
226 IF Y$="Y" AND B$(9)="N" THE
N PRINT AT 14,0;"NO I DON'T HAVE
WINGS
228 IF Y$="N" AND B$(9)="Y" THE
N PRINT AT 14,0;"YES I DO HAVE W
INGS
230 PRINT AT 15,0;"DO I HAVE SC
ALES(Y/N)? " : INPUT Y$
232 IF Y$="Y" AND B$(10)="Y" TH
EN PRINT AT 15,0;"CORRECT I DO H
AVE SCALES
234 IF Y$="N" AND B$(10)="N" TH
EN PRINT AT 15,0;"CORRECT I DON'
T HAVE SCALES
236 IF Y$="Y" AND B$(10)="N" TH
EN PRINT AT 15,0;"NO I DON'T HAV
E SCALES
238 IF Y$="N" AND B$(10)="Y" TH
EN PRINT AT 15,0;"YES I DO HAVE
SCALES
240 PRINT AT 16,0;"DO I HAVE BI
G CLAWS(Y/N)? " : INPUT Y$
242 IF Y$="Y" AND B$(11)="Y" TH
EN PRINT AT 16,0;"CORRECT I DO H
AVE BIG CLAWS
244 IF Y$="N" AND B$(11)="N" TH
EN PRINT AT 16,0;"CORRECT I DON'
T HAVE BIG CLAWS
246 IF Y$="Y" AND B$(11)="N" TH
EN PRINT AT 16,0;"NO I DON'T HAV
E BIG CLAWS
248 IF Y$="N" AND B$(11)="Y" TH
EN PRINT AT 16,0;"YES I DO HAVE
BIG CLAWS
250 PRINT AT 17,0;"DO I HAVE BI
G TEETH(Y/N)? " : INPUT Y$
252 IF Y$="Y" AND B$(12)="Y" TH
EN PRINT AT 17,0;"CORRECT I DO H
AVE BIG TEETH
254 IF Y$="N" AND B$(12)="N" TH
EN PRINT AT 17,0;"CORRECT I DON'
T HAVE BIG TEETH
256 IF Y$="Y" AND B$(12)="N" TH
EN PRINT AT 17,0;"NO I DON'T HAV
E BIG TEETH
258 IF Y$="N" AND B$(12)="Y" TH
EN PRINT AT 17,0;"YES I DO HAVE
BIG TEETH
260 PRINT AT 18,0;"DO I HAVE A
TAIL(Y/N)? " : INPUT Y$
262 IF Y$="Y" AND B$(13)="Y" TH
EN PRINT AT 18,0;"CORRECT I DO H
AVE A TAIL
264 IF Y$="N" AND B$(13)="N" TH
EN PRINT AT 18,0;"CORRECT I DON'
T HAVE A TAIL
266 IF Y$="Y" AND B$(13)="N" TH
EN PRINT AT 18,0;"NO I DON'T HAV
E A TAIL
268 IF Y$="N" AND B$(13)="Y" TH
EN PRINT AT 18,0;"YES I DO HAVE
A TAIL

```



```

270 PRINT AT 19,0;"DO I HAVE A
SHELL(Y/N)?" : INPUT Y$
272 IF Y$="Y" AND B$(14)="Y" TH
EN PRINT AT 19,0;"CORRECT I DO H
AVE A SHELL"
274 IF Y$="N" AND B$(14)="N" TH
EN PRINT AT 19,0;"CORRECT I DON'
T HAVE A SHELL"
276 IF Y$="Y" AND B$(14)="N" TH
EN PRINT AT 19,0;"NO I DON'T HAV
E A SHELL"
278 IF Y$="N" AND B$(14)="Y" TH
EN PRINT AT 19,0;"YES I DO HAVE
A SHELL"
400 PRINT AT 21,0;"WOULD YOU LI
KE TO SEE A PICTURE OF A ";D$;"(
Y/N)?"
410 INPUT P$: IF P$="Y" THEN GO
SUB 8000
495 INPUT "ANOTHER ANIMAL (Y/N)
?" : M$: IF M$="N" THEN PRINT "BYE
SEE YOU LATER" : STOP
496 IF M$<>"N" THEN GO TO 10
499 STOP
500 IF C$="I" THEN LET D$="INSE
CT"
501 IF C$="B" THEN LET D$="BIRD"
502 IF C$="F" THEN LET D$="FISH"
503 IF C$="M" THEN LET D$="MAMM
AL"
504 IF C$="K" THEN LET D$="MOLL
USK"
505 IF C$="C" THEN LET D$="CRUS
TACEAN"
506 IF C$="R" THEN LET D$="REPT
ILE"
510 RETURN
600 IF Z$="I" THEN LET X$="INSE
CT"
601 IF Z$="B" THEN LET X$="BIRD"
602 IF Z$="F" THEN LET X$="FISH"
603 IF Z$="M" THEN LET X$="MAMM
AL"
604 IF Z$="K" THEN LET X$="MOLL
USK"
605 IF Z$="C" THEN LET X$="CRUS
TACEAN"
606 IF Z$="R" THEN LET X$="REPT
ILE"
607 IF Z$="" THEN LET X$="NOTHI
NG"
610 RETURN
1005 LET A$="AARDVARK" : LET B$="
YYNYNNNNNNNNNYN" : LET C$="M" : RET
URN
1010 LET A$="ABALONE" : LET B$="Y
NNNNNNNNNNNNNY" : LET C$="K" : RETU
RN
1020 LET A$="ALBATROSS" : LET B$=
"YYNYNNNNNNNNNYN" : LET C$="B" : RE
TURN
1030 LET A$="ALLIGATOR" : LET B$=
"YYNYNNNNNNNNYYN" : LET C$="R" : RE
TURN
1090 LET A$="BEETLE" : LET B$="YN
NNNNNNNNNNNN" : LET C$="I" : RETUR
N
1100 LET A$="BARNACLE" : LET B$="
NNNNNNNNNNNNNNY" : LET C$="C" : RET
URN
1110 LET A$="BARRACUDA" : LET B$=
"YNNNNNNNNNNNYN" : LET C$="F" : R
ETURN
7000 GO TO 10
8000 IF C$="M" THEN GO TO 8009
8001 IF C$="I" THEN GO TO 8200
8002 IF C$="B" THEN GO TO 8400
8003 IF C$="F" THEN GO TO 8600
8004 IF C$="R" THEN GO TO 8800
8005 IF C$="C" THEN GO TO 9000
8006 IF C$="K" THEN GO TO 9200
8008 STOP
8009 CLS : PRINT AT 2,0;"
CLASS - MAMMAL"
8010 PLOT 40,70
8020 DRAW 60,40,-PI/2+.5: DRAW 6
0,-20,-PI/7: DRAW 6,6,-PI/4: DRA
W 1,-4: DRAW 10,63,-PI/4: DRAW 0
,-64,-PI/4: DRAW 14,38,PI/16: DRA
W 2,28,PI/4: DRAW -12,-10,PI/4
8030 PLOT 178,97
8040 DRAW 20,-20,-PI/8: DRAW 6,-
6: DRAW -7,0,-PI: DRAW 3,-4: DRA
W -20,-10,-PI/2: DRAW 6,8,PI/4:
DRAW -25,0,-PI/1.2: DRAW 0,28,-P
I/3
8050 PLOT 40,70
8060 DRAW -14,0,PI: DRAW 18,-16,
PI
8070 PLOT 40,70

```

```

8080 DRAW 20,-28,PI/2: DRAW 6,-6
,-PI/2: DRAW 4,-4,PI: DRAW 48,-6
: DRAW -5,6,PI: DRAW -22,3: DRAW
10,10: DRAW -25,30,PI/1.5
8090 PLOT 101,50: DRAW 40,-4: DR
AW 30,-10,-PI/8: DRAW 30,0,PI/8:
DRAW 0,5,PI: DRAW -25,2: DRAW -
5,12,-PI/4
8100 CIRCLE 183,80,3: CIRCLE 183
,80,2
8120 PRINT AT 20,0;" A RABBIT
IS A MAMMAL"
8150 INPUT "DO YOU WANT A LIST O
F THE OTHER MAMMALS IN THIS PROG
RAM (Y/N)";L$: IF L$="N" THEN GO
TO 10
8155 COPY : CLS
8160 FOR I=1000 TO 5000 STEP 10
8170 GO SUB I: IF C$="M" THEN PR
INT A$;TAB 14;"ANS=";B$: LPRINT
A$;TAB 14;"ANS=";B$
8180 NEXT I
8200 CLS : PRINT AT 2,0;"
CLASS - INSECT"
8220 CIRCLE 125,135,3: CIRCLE 11
9,135,3: PLOT 125,138: DRAW -6,0
,PI/2: PLOT 119,132: DRAW 0,-3:
DRAW 6,0,-PI/2: DRAW 0,3: DRAW 0
,-3: DRAW 0,-20,-PI/2: DRAW -6,0
,-PI/2: DRAW 0,20,-PI/2
8230 PLOT 119,109: DRAW 3,-50,PI
/4: DRAW 3,50,PI/4
8240 DRAW 6,-6: DRAW 4,8: DRAW 2
,4,PI/2: PLOT 119,109: DRAW -6,-
6: DRAW -4,8: DRAW -2,4,-PI/2
8250 PLOT 117,124: DRAW -10,0: D
RAW 0,6: DRAW -2,4,-PI/2: PLOT 1
27,124: DRAW 10,0: DRAW 0,6: DRA
W 2,4,PI/2
8260 PLOT 119,129: DRAW -8,6: DR
AW 5,15: DRAW -2,4,-PI/2: PLOT 1
25,129: DRAW 8,6: DRAW -5,15: DR
AW 2,4,PI/2
8270 PLOT 119,117: DRAW -35,6,PI
/4: DRAW -35,-5,PI/4: DRAW 0,-5,
PI: DRAW 70,2,PI/6: DRAW -30,-10
: DRAW -40,-15,PI/4: DRAW 20,0,P
I/4: DRAW 53,25,PI/2
8280 PLOT 125,117: DRAW 35,6,-PI
/4: DRAW 35,-5,-PI/4: DRAW 0,-5,
-PI: DRAW -70,2,-PI/6: DRAW 30,-
10: DRAW 40,-15,-PI/4: DRAW -20,
0,-PI/4: DRAW -53,25,-PI/2
8320 PRINT AT 20,0;" A DRAGON
FLY IS AN INSECT"
8350 INPUT "DO YOU WANT A LIST O
F THE OTHER INSECTS IN THIS PROG
RAM (Y/N)";L$: IF L$="N" THEN GO
TO 10
8355 COPY : CLS
8360 FOR I=1000 TO 5000 STEP 10
8370 GO SUB I: IF C$="I" THEN PR
INT A$;TAB 14;"ANS=";B$: LPRINT
A$;TAB 14;"ANS=";B$
8380 NEXT I
8400 CLS : PRINT AT 1,0;"
CLASS - BIRD"
8410 PLOT 128,90: DRAW 30,33,PI/
4: DRAW 20,15,-PI/2: DRAW 13,-7,
-PI/2: DRAW -5,-5,-PI/2: DRAW 9,
-5,-PI/8: DRAW 9,2,-PI/6: DRAW -
11,2: DRAW 13,1,-PI/8: DRAW -15,
3,PI/8
8420 CIRCLE 180,130,2: CIRCLE 18
0,130,1.5: CIRCLE 180,130,.5: PL
OT 196,121: DRAW -10,-12,PI/2: D
RAW -21,-50,-PI/2: DRAW 7,10,PI/
4: DRAW -7,-10,-PI/4: DRAW -3,-5
8430 DRAW 10,-10: DRAW 15,-4,-PI
/4: DRAW -10,2,PI/4: DRAW 5,-5,-
PI/4: DRAW -10,7,PI/4: DRAW -8,-
5,PI/2: DRAW 6,6,-PI/2: DRAW -15
,12: DRAW 0,7,PI/4
8440 PLOT 170,62: DRAW 2,-4: DRA
W 18,-9: DRAW 15,-4,-PI/4: DRAW
-10,2,PI/4: DRAW 5,-5,-PI/4: DRA
W -10,7,PI/4: DRAW -8,-5,PI/2: D
RAW 6,6,-PI/2: DRAW -20,10
8450 PLOT 155,57: DRAW -30,10,-P
I/3: DRAW 20,4: DRAW 20,35,PI/1.
25: DRAW -20,-35,-PI/1.25: DRAW
-70,10,-PI/8: DRAW 30,-3: DRAW -
28,6: DRAW 50,5,PI/8
8460 PLOT 125,67: DRAW -90,-5: D
RAW 50,7: DRAW -50,0: DRAW 60,5
8520 PRINT AT 20,0;" A CAN
ARY IS AN BIRD"
8550 INPUT "DO YOU WANT A LIST O
F THE OTHER BIRDS IN THIS PROGRA
M (Y/N)";L$: IF L$="N" THEN GO T
O 10
8555 COPY : CLS
8560 FOR I=1000 TO 5000 STEP 10

```

```

8570 GO SUB I: IF C$="B" THEN PR
INT A$;TAB 14;"ANS=";B$: LPRINT
A$;TAB 14;"ANS=";B$
8580 NEXT I
8600 CLS : PRINT AT 1,0;"
CLASS - FISH"
8610 PLOT 30,75: DRAW 0,6,-PI/2:
DRAW 6,4,-PI/4: DRAW 23,15: DR
W 110,5,-PI/5: DRAW 22,0,PI/5: D
RAW 20,11,PI/6: DRAW 15,7,-PI/6:
DRAW 5,-3,-PI/1.2: DRAW -20,-22
,-PI/8
8620 DRAW 0,-5,PI: DRAW 13,-17,-
PI/8: DRAW -5,-5,-PI: DRAW -15,9
: DRAW -41,0,PI/3: DRAW -27,-8,-
PI/8: DRAW -83,-9,-PI/8: DRAW -2
2,7: DRAW 0,2,-PI: DRAW 3,-1: DR
AW -3,4
8630 CIRCLE 46,87,2: PLOT 46,87:
PLOT 56,98: DRAW 0,-34,-PI/9
8640 PLOT 72,70: DRAW 15,3: DRAW
5,-11,-PI: DRAW -20,-3,-PI/3: D
RAW -1,6
8650 PLOT 92,63: DRAW 9,-16,PI/4
: DRAW 8,2,PI/2: DRAW 4,11,PI/8:
DRAW -14,4,-PI/4
8660 PLOT 148,73: DRAW 10,-12: D
RAW 5,0,PI/2: DRAW 9,14,-PI/4: D
RAW -9,4,-PI/8
8670 PLOT 187,85: DRAW 0,18,PI
8680 PLOT 162,106: DRAW 10,4: DR
AW -5,4,PI/4: DRAW -50,8,PI/8: D
RAW -5,4,-PI/2.5: DRAW -1,5: DR
AW -5,0,PI: DRAW -15,-22,-PI/8
8720 PRINT AT 20,0;" A CA
RP IS A FISH"
8750 INPUT "DO YOU WANT A LIST O
F THE OTHER FISH IN THIS PROGRAM
(Y/N)";L$: IF L$="N" THEN GO TO
10
8785 COPY : CLS
8790 FOR I=1000 TO 5000 STEP 10
8770 GO SUB I: IF C$="F" THEN PR
INT A$;TAB 14;"ANS=";B$: LPRINT
A$;TAB 14;"ANS=";B$
8780 NEXT I
8800 CLS : PRINT AT 2,0;"
CLASS - REPTILE"
8810 PLOT 100,72: DRAW -2,0,-PI:
DRAW -7,0,PI: DRAW 9,-10,PI/2:
DRAW 0,-21,-PI: DRAW -30,7,-PI/4
: DRAW 0,36,-PI/2: DRAW 57,15,-P
I/4
8820 DRAW -2,-6: DRAW -50,-11,PI
/4: DRAW 0,-30,PI/2: DRAW 26,-6,
PI/4: DRAW 0,12,PI: DRAW -12,10,
-PI/2: DRAW 10,5,-PI
8830 PLOT 124,93: DRAW -2,-16,PI
/10: DRAW 11,-11,PI/2: DRAW 50,4
,PI/4: DRAW 0,20,PI: DRAW -43,8,
PI/8: DRAW -4,-24,PI/8: DRAW 41,
0,PI/8: DRAW 1,10,PI: DRAW -40,8
,PI/8
8840 PLOT 127,100: DRAW 11,35: D
RAW 0,8: DRAW -8,-33,PI/1.7
8850 PLOT 140,99: DRAW 11,38,PI/
8: DRAW -12,-3,-PI/6: DRAW 5,0,-
PI
8860 PLOT 138,143: DRAW 16,-3,-P
I/2: DRAW -3,-3: DRAW 4,4: DRAW
-10,-35,-PI/1.7
8870 CIRCLE 138,142,1: CIRCLE 14
6,141,1
8920 PRINT AT 20,0;" A COBR
A IS A REPTILE"
8950 INPUT "DO YOU WANT A LIST O
F THE OTHER REPTILES IN THIS PRO
GRAM (Y/N)";L$: IF L$="N" THEN G
O TO 10
8955 COPY : CLS
8960 FOR I=1000 TO 5000 STEP 10
8970 GO SUB I: IF C$="R" THEN PR
INT A$;TAB 14;"ANS=";B$: LPRINT
A$;TAB 14;"ANS=";B$
8980 NEXT I
9000 CLS : PRINT AT 2,0;"
CLASS - CRUSTACEAN"
9030 PLOT 125,119: DRAW 111,-5,-
PI/3: DRAW -7,1,-PI/1.6: DRAW 6,
-11: DRAW -26,12
9032 DRAW -4,12,PI/8: DRAW 4,-12
,-PI/8: DRAW -8,0,-PI/2: DRAW -4
,13,PI/8: DRAW 4,-13,-PI/8: DRAW
-8,-2,-PI/2: DRAW -4,16,PI/8: D
RAW 4,-16,-PI/8
9034 DRAW -10,0,-PI/2: DRAW -4,1
6,PI/8: DRAW 4,-16,-PI/8: DRAW -
6,-2,-PI/2: DRAW -6,18,PI/8: DR
AW 6,-18,-PI/8
9036 DRAW -9,-8,-PI/2: DRAW -6,2
6,PI/3: DRAW 6,-26,-PI/3: DRAW -
7,-2,-PI/2: DRAW -6,26,PI/2
9040 PLOT 125,119: DRAW -27,-10,
PI/8: DRAW 4,-1: DRAW -2,-2: DR
AW 4,0: DRAW -2,-3: DRAW 6,3: DR
AW 4,-8: DRAW -7,4,-PI/4: DRAW 37
,-2,PI/3

```

```

9050 DRAW -5,-25,PI/8: DRAW 2,7:
DRAW -2,-7: DRAW 10,30,PI/8: DR
AW -3,1,PI: DRAW -3,-6
9060 PLOT 144,75: DRAW 3,0,PI: D
RAW 3,36,PI/8: DRAW -3,0,PI: DR
AW -3,-36,-PI/8
9062 PLOT 150,106: DRAW 3,0,-PI:
DRAW 4,-27: DRAW -3,0,-PI: DRAW
-3,27
9064 PLOT 153,106: DRAW 4,1,-PI:
DRAW 15,-25: DRAW -4,-1,-PI: DR
AW -15,25
9066 PLOT 163,103: DRAW 13,-10:
DRAW 3,-12: DRAW 3,0,PI: DRAW -3
,14: DRAW -12,11
9070 PLOT 110,105: DRAW -7,-2,-P
I/4: DRAW -55,-55,PI/8: DRAW 55,
67,-PI/8
9080 PLOT 100,108: DRAW -7,-3,-P
I/4: DRAW -57,-32,PI/3: DRAW -25
,-10,-PI/2: DRAW 25,11,PI/2: DR
AW 53,32,-PI/3: DRAW 3,3
9090 PLOT 109,115: DRAW -37,9,PI
/8: DRAW -25,-13,PI/2: DRAW 25,7
,-PI/4: DRAW 6,-6,-PI/2: DRAW -2
0,-5: DRAW -9,3,-PI/2: DRAW 9,0,
PI/2: DRAW 16,8,PI/8: DRAW 6,-6,
-PI/2: DRAW 25,0,-PI/4
9100 PLOT 123,95: DRAW -6,-6: DR
AW -14,-14,-PI/4: DRAW -24,-29,P
I/4: DRAW 27,23,-PI/8: DRAW 0,6,
PI/2: DRAW 0,-6,-PI/2: DRAW -19,
-25,-PI/3: DRAW 25,17,PI/3: DR
AW 11,25,PI/5: DRAW -5,5,PI/2: DR
AW 5,-5,-PI/2: DRAW 7,8
9110 PLOT 107,110: DRAW 5,2,-PI/
4: DRAW -5,-2,-PI/4
9120 PRINT AT 20,0;" A LOBSTE
R IS A CRUSTACEAN"
9150 INPUT "DO YOU WANT A LIST O
F THE OTHER CRUSTACER IN THIS PR
OGRAM (Y/N)";L$: IF L$="N" THEN
GO TO 10
9155 COPY : CLS
9160 FOR I=1000 TO 5000 STEP 10
9170 GO SUB I: IF C$="C" THEN PR
INT A$;TAB 14;"ANS=";B$: LPRINT
A$;TAB 14;"ANS=";B$
9180 NEXT I
9200 CLS : PRINT AT 2,0;"
PHYLUM - MOLLUSK"
9210 PLOT 110,88: DRAW 6,0,-PI:
DRAW -11,0,-PI: DRAW 22,0,-PI: D
RAW -34,-0,-PI: DRAW 43,0,-PI: D
RAW -60,-0,-PI: DRAW 83,0,-PI
9220 DRAW 5,-7,PI/4: DRAW -34,-1
2,-PI/8
9230 PLOT 110,58: DRAW -58,0: DR
AW 7,-5,PI/2: DRAW 51,-3,PI/16:
DRAW 50,6,PI/8: DRAW 30,12,PI/4:
DRAW 10,14: DRAW 16,8,-PI/4
9240 DRAW -5,4: DRAW -12,-7,-PI/
2
9250 PLOT 216,90: DRAW -7,16,PI/
4: DRAW 6,14: DRAW -5,0,PI: DRAW
-6,-16: DRAW -4,0: DRAW -6,12:
DRAW -6,0,PI
9260 DRAW 6,-14: DRAW -20,-20,PI
/4: DRAW -10,-2,-PI/2
9270 CIRCLE 202,97,2
9320 PRINT AT 20,0;" A SNAI
L IS A MOLLUSK"
9350 INPUT "DO YOU WANT A LIST O
F THE OTHER MOLLUSCA IN THIS PRO
GRAM (Y/N)";L$: IF L$="N" THEN G
O TO 10
9355 COPY : CLS
9360 FOR I=1000 TO 5000 STEP 10
9370 GO SUB I: IF C$="K" THEN PR
INT A$;TAB 14;"ANS=";B$: LPRINT
A$;TAB 14;"ANS=";B$
9380 NEXT I
9490 STOP
9500 INK 0: PLOT 105,160: DRAW 0
,10: DRAW -5,0: DRAW 10,0: PLOT
115,160: DRAW 0,10: DRAW 0,-5: D
RAW 10,0: DRAW 0,5: DRAW 0,-10:
PLOT 140,160: DRAW -10,0: DRAW 0
,5: DRAW 7,0: DRAW -7,0: DRAW 0,
5: DRAW 10,0
9510 INK 1: PRINT AT 3,10;"(100%
BASIC)"
9520 INK 0: PLOT 30,126: DRAW 0
,5: DRAW 10,0,-PI: DRAW -10,0: DR
AW 10,0: DRAW 0,-5: PLOT 45,126:
DRAW 0,10: DRAW 10,-10: DRAW 0,
10: PLOT 60,126: DRAW 10,0: DRAW
-5,0: DRAW 0,10: DRAW -5,0: DR
AW 10,0
9530 PLOT 75,126: DRAW 0,10: DR
AW 5,-10: DRAW 5,10: DRAW 0,-10:
PLOT 90,126: DRAW 0,5: DRAW 10,0,
-PI: DRAW -10,0: DRAW 10,0: DR
AW 0,-5: PLOT 105,136: DRAW 0,-10
: DRAW 10,0

```



```

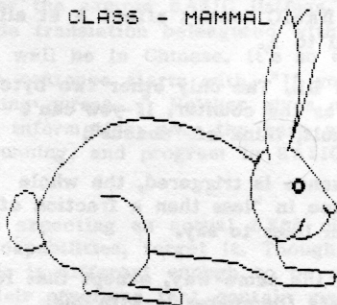
9540 PLOT 130,126: DRAW 0,5: DRA
W 10,-5: DRAW -10,5: DRAW 10,5:
DRAW -10,-5: DRAW 0,5: PLOT 145,
126: DRAW 10,0: DRAW -5,0: DRAW
0,10: DRAW 5,0: DRAW -10,0: PLOT
150,126: DRAW 0,10: DRAW 10,-10
: DRAW 0,10
9550 PLOT 180,131: DRAW 5,0: DRA
W -10,0,-PI: DRAW 10,3,-PI/1.4:
PLOT 195,126: DRAW -5,0: DRAW 0,
10: DRAW 5,0: DRAW 0,-10,-PI
9560 PLOT 210,126: DRAW 0,10,-PI
: DRAW 0,-10,-PI: PLOT 220,126:
DRAW 0,10: DRAW 5,-10: DRAW 5,10
: DRAW 0,-10
9570 INK 1: PRINT AT 7,11;"(SORT
OF)";AT 9,15;"BY";AT 10,8;"LAR
RY L. LIEDTKE"
9580 INK 0: PRINT AT 13,0;"THERE
ARE 327 CATALOGED ANIMALS WITH
15 QUESTIONS FOR EACH -- OR 11,44
5 POSSIBLE ANSWERS!!"
9590 PRINT AT 18,10;"HAVE FUN"
9600 INPUT "FOR SOME CLUES -PRES
S ENTER";J$
9610 CLS
9620 PRINT AT 0,13;"CLUES"
9630 PRINT AT 2,0;"1. NOSES -BIR
DS HAVE NARES WHICH WE WILL CO
NSIDER TO BE NOSES. OTHERWISE
A NOSE IS A NOSE - SORT OF."
9635 PRINT
9640 PRINT "2. CLAWS - FINGER AN
D TOE NAILS ARE NOT CLAWS. BI
RDS OF PREY HAVE CLAWS - TWEE
TY BIRDS DO NOT. DOGS HAVE TO
ENAILS CATS HAVE CLAWS. SOME
OTHER WEIRD CREATURES ALSO HA
VE CLAWS."
9645 PRINT
9650 PRINT "3. FEEL FREE TO OBJE
CT TO MY ANSWERS -IF YOU T
HINK IT WILL MAKE YOU FEEL ANY
BETTER!"
9655 PRINT
9660 PRINT "4. YOU MUST ANSWER "
"WHAT AM I" - OTHERWISE JUST
HOLD DOWN THE ENTER KEY TO CH
EAT AND SKIP THE QUESTIONS!"
9670 INPUT "IF YOU ARE READY PRE
SS ENTER";K$
9680 CLS : GO TO 10

```

Program ANIMALSLLL
Listing 1

A sampling of animals to put into the data statements. The animal's NAME goes into A\$, the ANSWERS go into B\$, and the CLASS code goes into C\$ (see lines 500-510 for the proper codes):

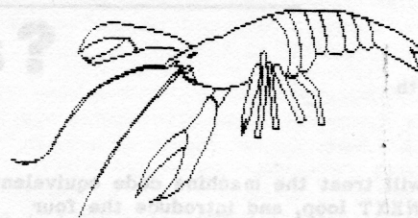
CLASS - MAMMAL



A RABBIT IS A MAMMAL

AARDVARK	ANS=YYYYNNNNNNNNNN
ANTEATER	ANS=YYYYNNNNNNNNNN
BABOON	ANS=YYYYNNNNNNNNNN
BADGER	ANS=YYYYNNNNNNNNNN
BANDICOOT	ANS=YYYYNNNNNNNNNN
BEAVER	ANS=YYYYNNNNNNNNNN
BIGHORN	ANS=YYYYNNNNNNNNNN
BISON	ANS=YYYYNNNNNNNNNN
BEAR	ANS=YYYYNNNNNNNNNN
CAMEL	ANS=YYYYNNNNNNNNNN
CAPUCHIN	ANS=YYYYNNNNNNNNNN
CAPYBARA	ANS=YYYYNNNNNNNNNN
CARIBOU	ANS=YYYYNNNNNNNNNN
CAT	ANS=YYYYNNNNNNNNNN
CHAMOIS	ANS=YYYYNNNNNNNNNN
CHEETAH	ANS=YYYYNNNNNNNNNN
CHIMPANZEE	ANS=YYYYNNNNNNNNNN

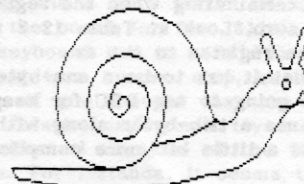
CLASS - CRUSTACEAN



A LOBSTER IS A CRUSTACEAN

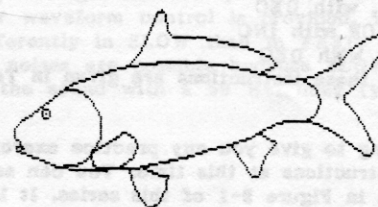
BARNACLE	ANS=NNNNNNNNNNNNNNNN
CRAYFISH	ANS=NNNNNNNNNNNNNNNN
FAIRY SHRIMP	ANS=NNNNNNNNNNNNNNNN
HERMIT CRAB	ANS=NNNNNNNNNNNNNNNN
LOBSTER	ANS=NNNNNNNNNNNNNNNN
PRAWN	ANS=NNNNNNNNNNNNNNNN
ROBBER CRAB	ANS=NNNNNNNNNNNNNNNN
SACCOLINA	ANS=NNNNNNNNNNNNNNNN
SHORE CRAB	ANS=NNNNNNNNNNNNNNNN
SHRIMP	ANS=NNNNNNNNNNNNNNNN
SLATER	ANS=NNNNNNNNNNNNNNNN
SPIDER CRAB	ANS=NNNNNNNNNNNNNNNN
SQUAT LOBSTER	ANS=NNNNNNNNNNNNNNNN
WOODLOUSE	ANS=NNNNNNNNNNNNNNNN

PHYLUM - MOLLUSK



A SNAIL IS A MOLLUSK

ABALONE	ANS=NNNNNNNNNNNNNNNN
CLAM	ANS=NNNNNNNNNNNNNNNN
CONCH	ANS=NNNNNNNNNNNNNNNN
CUTTLEFISH	ANS=NNNNNNNNNNNNNNNN
GARDEN SNAIL	ANS=NNNNNNNNNNNNNNNN
LIMPET	ANS=NNNNNNNNNNNNNNNN
MUSSEL	ANS=NNNNNNNNNNNNNNNN
NAUTILUS	ANS=NNNNNNNNNNNNNNNN
NEOPILINA	ANS=NNNNNNNNNNNNNNNN
OCTOPUS	ANS=NNNNNNNNNNNNNNNN
OYSTER	ANS=NNNNNNNNNNNNNNNN
PERIWINKLE	ANS=NNNNNNNNNNNNNNNN
POND SNAIL	ANS=NNNNNNNNNNNNNNNN
PURPLE SEA SNAIL	ANS=NNNNNNNNNNNNNNNN
RAZOR SHELL	ANS=NNNNNNNNNNNNNNNN
SCALLOP	ANS=NNNNNNNNNNNNNNNN
SEA HARE	ANS=NNNNNNNNNNNNNNNN
SEA SLUG	ANS=NNNNNNNNNNNNNNNN
SHIPWORM	ANS=NNNNNNNNNNNNNNNN
SLUG	ANS=NNNNNNNNNNNNNNNN
SQUID	ANS=NNNNNNNNNNNNNNNN
TOPSHELL	ANS=NNNNNNNNNNNNNNNN
WHELK	ANS=NNNNNNNNNNNNNNNN



BASIL'S COMPENDIUM

Basil Wentworth

FOR...NEXT

This chapter will treat the machine code equivalent of the FOR...NEXT loop, and introduce the four "packaged loops" whose mnemonics end in "R".

You may have noticed that Chapter 12 incorporated the equivalent of a FOR...NEXT loop in some of its examples. For instance, Figure 12-3 could just as well have been expressed as a loop, as shown in Figure 13-1.

```
1010 LET N=2
1020 FOR A=1 TO 3
1030 LET N=N+2
1040 NEXT A
1050 PRINT A
```

Figure 13-1. The explicit loop

One technique that is often used in machine code to implement a loop is to load some register with the number of times the loops is to be executed, and to decrement that counter each time the program goes through the loop, terminating when the register has counted down to zero. Look at Table 12-2 when you're choosing the register to act as counter--notice that it has to be a one-byte register, if you're going to use DEC for keeping count. You could use a two-byter along with SUB or SBC, but that gets a little bit more complicated.

A PROBLEM

Use this technique to write a program that will calculate the fifth power of 2. You will find an answer in Figure 13-2. As always, your answer may be different--there are lots of possible solutions. And again as always, try for the most elegant solution you can find.

```
16514 22 - LD D,5
16515 5 Gr 5
16516 62 Y LD A,1
16517 1 Gr 1
16518 135 Gr 3 ADD A,A
16519 21 + DEC D
16520 32 4 JR NZ,-4
16521 252 UNPLOT
16522 6 Gr T LD B,0
16523 0
16524 79 ? LD C,A
16525 201 TAN RET
```

Figure 13-2. The fifth power of 2

PACKAGED LOOPS

Some instructions have loops built into them; notably:

- LDIR-repeat block load with INC
- LDDR-same, with DEC
- CPDR-block CP with INC
- CPDR-same, with DEC

The codes for these instructions are given in Table 13-1.

We aren't going to give you any practice exercises with these instructions at this time. You can see LDIR at work in Figure 9-1 of this series. It is also well worth while studying the use of this

family in Tom Woods's excellent PRO/FILE manual. We will, however, describe their operation in enough detail so you should be able to use them when the occasion arises.

```
LDIR 237,176
LDDR 237,184
CPDR 237,177
CPDR 237,185
```

Table 13-1. The packaged loops

Let's see how LDIR works. It's called a block transfer function, and it moves the contents of a block of consecutive bytes to a block of memory at some other address. You designate the address of the first byte of the source, the address of the first byte of the destination, and the number of bytes to be moved. One handy use for such an instruction would be to move a block of machine code from one address to another.

To use LDIR, you load HL with the current address of the first byte of the block you want to move, and load DE with the address of the first byte of the block you're going to move into. BE SURE THAT YOU HAVE MADE RESERVATIONS AT THE NEW ADDRESS--anything you have there will be overwritten, and the program may even crash if you destroy some of the data that the computer needs to keep itself sane. The safest approach is to make sure that there is a block of nulls at the new address--a block big enough to hold all of the stuff that you're planning to move in.

It's easy enough to remember which register does which during an LDIR maneuver. Just remember that DE stands for destination. HL, then, could stand for the "hole" that's going to be left after the data is moved out. Except that it won't really be a hole, of course. The bytes of data aren't actually removed; they're just copied at the new address. Just as LET B=A in BASIC doesn't affect A at all, but only sets B equal to A.

So much for DE and HL. The only other two-byte register, BC, serves as the counter. If you can't remember it by default, think of "abacus".

When the LDIR sequence is triggered, the whole transaction takes place in "less than a fraction of a second", as my son likes to say.

CPDR works in much the same way, except that it CP's each byte of data (compares it with the contents of the "A" register) instead of moving it.

LDDR and CPDR do the same things respectively, except that they start at the top address and work down. One possible use for LDDR that immediately comes to mind is the situation where you need more bytes at the beginning of your block of machine code bytes, so you must move the existing bytes forward as far as you need. A simple thing to do when you're using 1 REM to carry your machine code, but a little more complicated if the code is buried somewhere within the program.

Well, that's all for now. There will be more.

PC8300: ZX81 Clone

Is it Magic or Madness?

Fred Nachbaur

You may have seen ads, or heard about a "Timex 1000 clone" called the PC8300, available from a company in New Jersey doing business as "American Design Components." The price is certainly attractive (\$29.95), as are the claims that are made for this device. A TS1000 clone with music and sound, auto line numbering, moving keys, joystick port, TV/monitor option, high-res capability, and even a color add-on? For 29.95? How can this be?

As an avowed ZX81 programmer (perhaps one of the last), I couldn't resist the ad; especially since I've been interested in this machine for over two years! That's right, the history of the PC8300 goes back that far. About two years ago, it was reviewed in a British magazine, and was said to be available from a Canadian company for Cdn. \$29.95. A colleague contacted them, only to get the reply that they would not be carrying it after all, and didn't know where it could be obtained. Imagine our surprise and gratification when it suddenly reappeared.

On receiving my PC8300, the plot thickened even further. It is made in Hong Kong, but no indication is given as to the manufacturer, designer, or ROM programmers. The box is labelled "YOUR COMPUTER." Apparently, in true Hong Kong style, the manufacturer left it open for any distributor to stick his own label on the unit.

What you get is the computer, a TV/monitor cable, cassette cable, power supply, and two "manuals." I put the last in quotes, since neither of these publications is what I would consider an adequate user manual. The first is entirely in Chinese, except for the sample BASIC listings. The other is a very crude translation beleaguered with typos, and might as well be in Chinese. It's so crude that it's cute; one sentence starts with, "If you don't see the blinking cursor...." Neither gives much technical information; only the bare minimum to get up and running, and program in BASIC, is provided.

If you're expecting an actual ZX81 clone with superior capabilities, forget it. Though it is similar, it is different enough to be useless with any Sinclair programs that contain machine-code. More about that later. However, if like me you're running a computer orphanage, this machine is a **MUST HAVE**. It is eccentric yet capable, simple yet complex, and absolutely charming.

The machine is reminiscent of the TS1500 or Spectrum, in that it has rubber chiclet keys. Dual shift keys are provided (thankfully, since the key spacing is larger than the 1500). The keyboard is sloped, giving a nice feel. The keys have an unfortunate tendency to stick; perhaps this tendency will decrease as the keys "break in."

The case is ivory colored, quite sturdy, and sits nicely on the table. The case comes apart by removing three Phillips screws, then snapping it apart. The power supply has an actual AC power cord running into it; a nice feature if, like me, you have octopuses (octopi?) of adaptors and extension cords always underfoot.

The TV/monitor cable has an RCA plug at one end (to go to the computer), and an "F" connector at the other. You may have to change this to an RCA plug, depending on your monitor or TV. A "TV/GAME" switch is not provided. The display is in preferred (to me) "reverse video" (white characters on dark background).

Looking inside, it looks definitely Sinclairese. There is of course the 7805 regulator and heatsink, Z80 CPU, ROM, and a 2116 static 2K RAM. There is also space on the board for four 2114's. Near the (soldered in) keyboard tail is a 74LS05. The last major component is a custom chip, analogous to the Sinclair's ULA. If you thought that the ZX81 ULA was an interesting "black box," you'll love this one. It apparently handles all the jobs of the Sinclair ULA, and then some. For instance, it seems to take care of the sound, blinking (blinding?) cursor, and probably has something to do with the color add-on. Sundry diodes and transistors round out the semiconductor complement. A small 1" speaker delivers a surprisingly loud "beep."

The machine's sound capability is obvious the first time you turn it on. After that, any keypress elicits a beep. Each key has a different tone, making routine typing sound a John Cage composition. Thankfully, this can be turned off by entering **NOBEEP**. To quote from the manual,

"So many sound!" you may think. 'May I play my computer more quietly?' The answer is sure. You can simply type **NOBEEP** then **ENTER**. Now the computer is in No BEEP mode, and no any sound will be responded when you press the keys. Later, if you like to have beep sound again, you type **BEEP** then **ENTER**. Now the computer already in BEEP mode, and the keys will respond it's lively sound if you activated any key."

Syntax errors give a flatulent Bronx cheer, even if **NOBEEP** was invoked; this machine really likes to rub it in! The machine also has **TEMPO**, **SOUND** and **MUSIC** commands. These are actually pretty neat, even though only a single voice is possible, and no envelope or waveform control is provided. Also, they behave differently in **SLOW** than in **FAST**; some interesting noises are possible because **SLOW** mode modulates the sound with a 50 Hz. buzz (yes, 50 Hz. not 60).

This points out the first difference between the PC8300 and American ZX81's. Running a 50 Hz. makes it slightly faster (though not twice as fast as some have claimed). However, it might be out of range for the vertical hold control on some TV's.

Another major difference is in the memory map. Unlike the ZX81, the display file is in a fixed location, starting at 16509. The display file is always fully padded out. (Presumably, by getting rid of all the collapsed display-file stuff, the designers were able to fit the additional command routines into the 8K ROM.) The system variable D_FILE is replaced by PROGRAM, which gives the start of the program area (normally 17302d). The fact that a system variable is used for this, suggests that this can be moved (perhaps to accomodate a high-res display file). The end of the program area is marked with an FFh. The variables are next, pointed to as before with variable VARS. The end of the variables area is still marked with an 80h.

System variable VERS apparently identifies the PC8300; it contains 40h after reset, 00 after NEW or power-up, and FF after SAVE. Variables NXTLIN and E_PPC are exchanged to 16394 and 16425, respectively. The "not used" variable at 16417 is called MUNIT, and has to do with TEMPO. The unused variable at 16507 is now a two-byte variable called BLINK.

The rest of the system variables remain the same. Also, organization and storage of variables appears identical. However, the difference in the memory map makes every known ZX81 machine-code program inoperable on the PC8300. Also, the ROM has been drastically changed around, so any ROM calls would have to be readdressed for this machine. In light of this, I don't feel that the claim of "ZX81 compatibility" is justified.

Now for some good news. The PC8300 WILL load all-BASIC ZX81 programs. If you think about it for a moment, you'll realize that this is no small feat, since the display file and program area are interchanged. Also, some of the token codes are different. Again, the custom chip appears to be involved in this. When the PC8300 saves a program, the 5-second "silence" is replaced by a continuous tone; perhaps this is how it tells its own programs from ZX81 programs, changing things around if required.

You guessed it, even with all-BASIC there are incompatibilities. Most importantly, the variables area of ZX81 programs are NOT loaded by the PC8300. So any program that relies on its saved variables for data is completely useless on the PC8300. Also, some of the punctuation has been replaced by space-invaders and suchlike. Specifically, colon is a space invader, question mark is a pac-ghost, and the British pound sign is another space invader. Also, the grey graphics are now different; CHR\$ 8 and 136 (the grey squares) are now a race car, and the rest are right-triangle graphics. Sure looks funny on some ZX81 screens! The final incompatibility is that PC8300 programs will NOT load into the ZX81 or TS1000. (Obviously, since it will be trying to run the display file in its program area. CRASH!!!)

There is better news in the hardware department. The extension bus is identical to the ZX81/TS1000. Timex

16K RAMpacks work fine, as does our SCRAM board. I've also tried a John Oliger EPROM reader. Interestingly, the Memotech 64K does NOT work; I haven't tried any others. As we find out more, we'll keep you informed if the interest is there.

If you're used to the keyboard layout of the ZX81, you'll be lost when you first use the PC8300. Nothing is where you expect it to be. The FUNCTION mode has been done away with entirely; all you have is the shifted keys, and graphics mode (shift ENTER). Shifted keys give the symbols and some of the tokens. The only available command keyword is PRINT (shift Z, of all things); all the rest are functions like SIN, ACS, etc. The rest of the function and keyword tokens have to be entered manually. However, they are tokenized in the listing, just as on the ZX81. Spaces during line entry are insignificant, and are automatically inserted between tokens.

The designers obviously went for the programmable calculator market; there is even a chapter in the manual on using it as a calculator. While they were at it, they tried to suggest that it is a games machine by including a few (otherwise useless) space invader characters. The rest of the shifted keys are things like cursor control (C through N), EDIT (M), DELETE (.), auto LINE NO. (X) and BREAK (space). BREAK is interesting in that it can be used much like EDIT to delete an entire input line; however, it does not bring down the line number with the cursor, as EDIT does.

Scanning the ROM, you'll find very little in common with the ZX81. The restarts have been completely changed, as have the various data tables. The character font table is nowhere to be found; one correspondent suggested that these are stored in the custom chip. In fact, the area from 1E6B-1FFF is blank (all FF)... suggesting that EPROMs with additional features could be used.

During operation, the I register contains 0! This suggests that the font table is at 0000 (which it is not). Changing it has no visible effect, so it might be usable by m/c programmers. IX is still used in display, but in a different fashion. In both SLOW and FAST mode it vectors to 1334h; looking at this address shows code that isn't even vaguely similar to the old display routines. Perhaps IX is freed for programmer use during computing time, being revector only during the interrupt. IY seems to still be used to access system variables, but reading it gives the same as the contents of IX! Weird. AF' is still used as in the Sinclair system.

USR still passes and returns the contents of BC. The "1 REM" address for machine-code is now 17307 (instead of 16514). Without the color module attached, the PAPER and INK commands are accepted (values 0-255), but without visible effect.

High-res capability is hinted at, but no mention is made in the manual. Perhaps there's something in the Chinese manual; I'll let you know if my Chinese friend can find anything about this. Similarly, the color module is a mystery box; I don't have one (yet), and doubt whether I'd be much inclined to mess with it even when I get one.

The box claims auto-repeat on some keys; not so, at least not on my machine.

Before I end off, I'll point out one last feature that is simultaneously a blessing and a curse. That's the RESET button, which is in the upper right corner. No, it's not just a CPU RESET switch. It's actually a "soft" reset! After a reset, your BASIC program is still there! However, more likely than not your variables area will be zoofed. The curse is that it is very easy for ZX81 users to hit this by mistake in reaching for 0 or DELETE.

This is truly an orphan with personality; I like it, and suspect that others will also. If I can convince myself that there is enough of a market for software

for this machine, (including adaptations of Timex software), I will readily support it. Let me know if you're interested.

As a brief footnote to this article, Fred will soon be offering a replacement ROM for the PC8300 to make it TS1000 compatible (Isn't that an IBM word?). We'll have complete details in a future issue of SyncWare News. If you can't wait that long, send a self-addressed envelope and an IRC (International Reply Coupon, available from the Post Office) to: Silicon Mountain Computers, C-12, Mtn. Stn. Group Box, Nelson, BC V1L 5P1, Canada.-ed.

BBSing on an Unexpanded 2068

by Frank W. Davis

After you have been using your modem for awhile, you notice one thing most, it can be an enjoyable use of your computer. Sending and receiving electronic mail, uploading and downloading programs, and all of the different SIGS (special interest groups) that allow one to share common interests and hobbies with others are just a few of the opportunities available. The second thing you will notice (particularly if you do not live in a major city with ample electronic bulletin boards) is that your phone bill can grow in leaps and bounds. The good old long distance phone bill!

There are several ways around this. One is to set your modem aside forever (not me!) and try to forget about the fun you had using it. Another is to go on a tight budget about how often and for how long you use it. This is as distasteful to most folks as sticking to a diet to lose weight. A third way is to open up your own BBS and allow others to call you. It can be done on a part time basis during only set hours if you have only one phone line. It would probably still be cheaper for most of us to have a second basic phone line ran into the house and dedicate it to the BBS.

What has been lacking has been the software for the TS2068 to allow us to have a local BBS of our own that ran on our own computers. It always irked me just a tiny bit when I would hear of a Timex board being ran on a Radio Shack or an Atari. Some definite progress was made toward giving us our own local boards a while back when Randy and Lucy Gordon of the Ohio group in Cincinnati developed Tiny Board. This gave many of us a place to start from. I thank them for their pioneering work in this area.

Now we have some good software starting to hit the market that will allow us to have BBS's that will run on an unexpanded TS2068. You do not need a disc drive or an A&J Microdrive to run this. The software I am referring to is called the I.S.T.U.G. TS2068 BBS. It was developed and is being marketed by Paul Holmgren and Willie Jones of Indianapolis, Indiana. They are offering it on cassette, with all documentation, for only \$16.00 postage paid. That is a bargain in itself and leaves no room to justify pirating a copy by claiming the price is too high.

The program loads from cassette in under 50 seconds and uses approximately 8.5K of your memory. It is

almost all basic, with a small amount of code hidden in one line. The program is SYSOP Friendly. It gives him complete control over the program, yet protects the program from being broken into by the users of the system. I cannot say it is hacker proof, but I know of a couple of people who considered breaking into it ...but so far have failed. The program has so far been crashproof, and a few of the boards running it have been up constantly for over 6 months. Both of these are plus points for the program.

The program has a real time clock that keeps the time and date (it even advances the day at midnight). This feature allows the SYSOP to know exactly when someone called in and when they logged off the system.

When you log onto the system you are queried for information in order to log on, and informed you of the parameters. A menu is displayed giving the caller the choice of the following: check to see a list of regular users; quick scan the message base; read messages; leave a message; check time you've been on the board; leave a message to the SYSOP; page the SYSOP for a chat; read Bulletins; exit the system. The message base as set up is for 40 messages of 535 characters each. You may adjust this within the SYSOP menu. Each message is stamped with the time and date of when it was left and who it is from and who it is for. All of this data is printed out to a TS2040 printer, along with the following: the name of the caller; what messages were read; messages left; any paging of the SYSOP; time they left the system.

The program as sent does not come set up to use a disc drive or an A&J Microdrive, but it is not too hard to figure out. Doing this will enable the SYSOP to add more messages bases. You could extend the program to add bulletins, or possibly even an upload/download section. Figure this step out yourself or contact the program developers for some assistance.

The program is a great value for your money and should rank as one of the must programs for the TS2068 telecommunicator. To buy this program contact Willie Jones, 10126 E. 33rd ST., Indianapolis, IN 46236. Or, if you want to check the board out before buying it, then fire up your modem and call the I.S.T.U.G. board at 317-898-3903.

Dot-Matrix Bit Graphics

Robert D. Hartung

A current ad for a book about dot-matrix printers states that 80% of the users only make use of about 20% of the features available to them. Whether this is an accurate estimate or not, it is likely that when we unpacked our new printer the most of us did not spend much time on the bit-graphics part of the manual, especially if it had lost something in the translation from an Oriental language.

If the print-wires in your printer fire in a vertical configuration (as opposed to some jet printers that use a series of horizontal dot-sweeps) some of the things I have learned in my own experimentation may be of interest to you and, hopefully, more informative than confusing! Please note that all listings as given are for a C. Itoh 8510 driven by the printer routine in Tom Woods' ProFile which uses the "↑" (SS/H) character and 1Bh as ESC command delimiters, so revisions will be needed to use them with other printers and driving software.

Bit-graphic gets its name from the printing of one dot on paper or the setting of one pixel in the display to correspond with each bit of data that is set to 1. A 0 bit prints or sets a dot-space. A pseudo bit-graphic routine was given in my Jan. 1986 SWN article which demonstrates the principle. It will work with daisy-wheel as well as dot-matrix printers by using a period (.) instead of a graphic dot. For those who missed that issue, here is a version that will make a full-page screen dump with most printers when done in proportional mode with a very small line-feed increment. Shorten the H/V loops if over-printing occurs.

```

10> FOR H=0 TO 255: REM Horiz
ntal scan
20 FOR V=0 TO 175: REM Vertica
l scan
30 IF POINT (H,V) THEN LPRINT
" "
40 IF NOT POINT (H,V) THEN LPR
INT " "
50 NEXT V
60 LPRINT
70 NEXT H

```

Listing #1

While a full screen-dump or copy in normal or enlarged format is fine for some purposes such as hi-res drawings or graphs, it is desirable at times to selectively scan and copy parts of the display. For example, the following routine will read in sequence the very top pixel-row followed by the 9th pixel-row, then the 2nd row followed by the 10th, and so on. The accumulated data for each pair of pixel-rows is held in the printer buffer along with one bit-space between each bit-dot (line 70) or else two bit-spaces if a scanned pixel is not set or 0 (line 80). When the line 100 LPRINT occurs, the buffer is dumped to print out in 64-column format whatever is displayed in the T/S font, or as UDGs, or custom-font characters in the top two lines of the screen.

In line 30, the ESC S0002 command tells my printer to read the next two bytes as a two-bit-row graphic character. Think of the 01h as setting the top bit in an 8-bit vertical row or just one dot-bit. The 00h then sets none of the bits in the bit-row of the second character-byte. Actually, the other 7 bits

```

1>CLS: PRINT "This two-line
32-column display will be copied
as one 84-column."
5 LPRINT "↑1BP↑1B↑1BT01"
10 FOR V=175 TO 168 STEP -1
20 FOR H=0 TO 255
30 IF POINT (H,V) THEN LPRINT
"↑1B30002↑01↑00";
40 IF NOT POINT (H,V) THEN LPR
INT "↑1B2";
50 NEXT H
60 FOR H=0 TO 255
70 IF POINT (H,V-8) THEN LPRIN
T "↑1B30002↑01↑00";
80 IF NOT POINT (H,V-8) THEN L
PRINT "↑1B2";
90 NEXT H
100 LPRINT
110 NEXT V

```

Listing #2

overprint with the line 5 LF command of 1/144" but as bit-spaces nothing is printed. If the first byte is defined as 03h (a character two dots high) the LF increment may be increased by 1 for an enlarged copy. Sprites may printed by careful horizontal and vertical character alignment on consecutive print-lines. The time required to do all this scanning in Basic is about two minutes for each 64-column line of copy and about one minute in compiled code.

Alternatively, we could fully define each 8-bit-row element before it is sent to the printer. This is done in LISTING 3 by first doing a scan from top to bottom of the left-most column of pixels in display-line 0 and storing it as a BIN value in B\$. Line 80 converts this to a one-byte character and stores it in P\$. The same is done with line 1, then the next column of line 0 and so on until all the bytes are stored in P\$. Lines 110-140 provide options of two or one or no bit-spaces between dot-columns to change character size. Making line 10 FOR N=0 TO 0 would scan only the top line, while making it FOR N=0 TO 2 would scan the top three lines and print them out as one line. The routine is placed at the beginning of the listing so the FOR-NEXT loops will run as fast as possible, but again about two minutes are required per 64-column line of printout.

```

5>LET P$=""
10 FOR N=0 TO 1
20 LET V1=175-N*8-7: LET V2=17
5-N*8
30 FOR H=0 TO 255
40 LET B$="BIN "
50 FOR U=V1 TO V2
60 LET B$=B$+STR$ (POINT (H,U)
)
70 NEXT U
80 LET P$=P$+CHR$ VAL B$
90 NEXT H
100 NEXT N
110 PRINT #0;"Key 1 for condens
ed--2 for elite--3 for expanded
(pica)": PAUSE 0: GO TO 120+10*(
INKEY$="2")+20*(INKEY$="3")
120 FOR N=1 TO 512: LPRINT "+1B
50001";P$(N);: NEXT N: LPRINT :
RETURN: REM Condensed
130 FOR N=1 TO 512: LPRINT "+1B
50001";P$(N);"+1B1";: NEXT N: LP
RINT : RETURN: REM Elite
140 FOR N=1 TO 512: LPRINT "+1B
50001";P$(N);"+1B2";: NEXT N: LP
RINT : RETURN: REM Pica
9000 CLS : PRINT AT 0,0;"This line
will be copied (along with an
y UDCs) by top subroutine"
9010 GO SUB 5

```

Listing #3

Obviously, when written in Basic the approaches to bit-graphics we have looked at so far are not time-efficient, but they do allow a flexibility for doing printouts of anything that can be put into the top lines of the display. We could hurry things up a great deal if instead of scanning characters bit-by-bit to recreate them we read them directly from a predefined font table. The UDG file is such a table but unless pages of characters are moved in and out it is limited to 21 characters.

However, our TS2068 manual tells us in Appendix D that if we poke the two system variables for CHARS they can be used to point the computer to a user-defined character font in RAM instead of the one in ROM. To make it easier to switch from one font table to another, we need only POKE 23607, (MSByte-1) for an address 256 less than the beginning of the file location. The 256-byte offset is because character-codes 0 through 31 are not used by TS2068 characters (32 * 8 bytes per character = 256). The other end of the font table stops at character-code 127 or 760 bytes in all, including the curly brackets and copyright symbol. POKE 23607,60 returns us to the ROM table.

The hardest part of using alternate fonts is the defining of the characters themselves, unless you can lift the font table out of a program that contains the characters you want. To find where the table begins, look for a program line that pokes something other than 60 to 23607. Multiply this value plus 1 times 256 for the starting address (plus any value other than 0 if 23606 is also poked). To save, use SAVE "table"CODE (address),760.

Character-definition programs do not usually provide for rotating the characters 90 degrees clockwise from the upright position as required by many printers. The routine in LISTING 3 will do this with no strain or pain. It uses the display file for a series of decimal-to-binary conversions. These are stored in an 8 X 8 string array, from which BIN strings are stripped off and poked back as character bytes in the required order. If you want to observe the results, insert line 195 PRINT AT 0,5; CHR\$ C: PAUSE 30. If you intend to also use your font tables for screen-copy routines, save a copy in normal position before rotating them.

```

5 LET F=(Font table MSB-1)
10 CLS : POKE 23607,F
20 LET file=(F+1)*256
30 FOR C=32 TO 127
40 PRINT AT 0,0;CHR$ C
50 DIM B$(8,8)
60 FOR N=1 TO 8: LET B$(N)=""
70 FOR U=168 TO 175
80 FOR H=0 TO 7
90 IF POINT (H,U) THEN LET B$(
U-167,H+1)="1"
100 NEXT H
110 NEXT U
120 FOR K=1 TO 8
130 LET P$="BIN "
140 FOR N=1 TO 8
150 LET P$=P$+B$(N,K)
160 NEXT N
170 POKE file,VAL P$
180 LET file=file+1
190 NEXT K
200 NEXT C
210 POKE 23607,60

```

Listing #4

After all the preliminary work is done, a quite simple program such as LISTING 5 will read into the printer the normal LPRINT sequences and will also switch between font tables as well as the UDG file. The text-entry routine shown in lines 200-240 may be used to input 64-character lines into the T\$ array.

To stop input when INPUT LINE is used, key the down-cursor (CAPS SHIFT/6). Single quotation marks will be accepted. (This routine may be merged with the previous demo listings.)

Any word or phrase you want in a defined font is bracketed by inserting delimiter characters before and after it. As given, the listing calls for a GO SUB to the appropriate bit-graphic routine when it encounters a UDG character or a reverse-slash. Then during the subroutine a return will be made to normal LPRINT when it comes to the same delimiter character at the end of the word or phrase. If you wish an entire file to be printed in another font, the main printout routine may be altered to read all characters as in the subroutine, but without delimiter checks for faster running.

```

5>REM Table address 59904
10 FOR Y=N+1 TO 64
20 IF T$(U,Y)="" THEN LET N=Y
30 GO TO 8060
40 PRINT T$(U,Y);
50 LPRINT "1850001";CHR$ (PEE
K (59904+Z+(CODE T$(U,Y)-32)*8))
;"181";
60 NEXT Z
70 NEXT Y
80 GO TO 8060
90 FOR Z=0 TO 7
100 LPRINT "1850001";CHR$ (PEE
K (65368+Z+(CODE T$(U,N)-144)*8))
;"181";
120 NEXT Z
130 GO TO 8060
200 REM Input routine
205 CLS : PRINT "Key down-curs
" & GO TO 8000 for printout"
210 LET LN=72: DIM T$(LN,64)
220 FOR N=1 TO LN
230 INPUT LINE T$(N)
240 NEXT N
8000 REM Printout
8010 FOR U=1 TO LN
8020 FOR N=1 TO 64
8030 INPUT "": PRINT T$(U,N);
8040 GO TO 8050-8040*(T$(U,N)=""
)-7950*(CODE T$(U,N)>143)
8050 LPRINT T$(U,N);
8060 NEXT N
8070 PRINT : LPRINT
8080 NEXT U
8090 PRINT : LPRINT

```

Listing #5

I hope these demonstrations will provide a spring-board for ideas and refinements of your own to unlock more of the power that is in your printer.



Byte Graphics

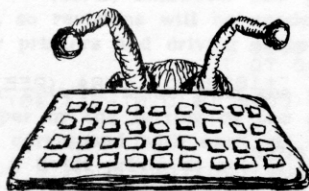
CLASSIFIED

Do you have something to sell?
Let everyone know! Just \$2.75 a
line will put it here. 32 column
(screen) format, include spaces
in your text, and send CK or MO
with your listing.

Send to SWN Classified, 602 S.
Mill St., Louisville, OH 44641

TS-1000; TS-2040; MEMOTECH ADD-ONS
(RAMS, K-BOARD, HRG, PRINTER I/F, ETC);
BROTHER THERMAL PRINTER; 12" MONO-
CHROME MONITOR; SOFTWARE, BOOKS (WILL
SEND LIST ON REQUEST). A. LAVIOLETTE
16-1385 BERNARD MONTREAL CANADA H2V 1W1

FOR SALE: TS1000 FEMALE EDGE CONNECTORS
(WITH SLOT) \$4 EACH T. WOODS, BOX 64,
JEFFERSON, NH 03583



Oliger DOS v.2 & Pro/File Cartridge

These two are superb with each other. The speed of
the DOS makes a TS2068 file management program
practical. They don't get any better than these
two.

Pro/File's built-in custom search command, "<=" (SYMBOL-SHIFT Q), allow executing BASIC programming from the Pro/File menu. If a disk has a CAT and Loader program as disk file 0, the data entry required to LOAD new data into Pro/File is reduced to a few keystrokes.

Install the Pro/File cart and exit to BASIC with the search command "<=". Add this BASIC to the existing Pro/File line 1 REM and re-enter with "GO TO 5". From Pro/File you may SAVE data under the current name with a search command of "<=S". Program-0 on the disk is accessed with a search command of "<=L". Any other search command with a prefix of "<=" returns you to BASIC and executes any programing existing after line 10.

```
2 IF X$="<=L" THEN LOAD
3 IF X$="<=S" THEN SAVE /F$ L
INE VAL "0"
5 POKE VAL "20750",VAL "128"
GO TO NOT PI
10 IF X$="<=S" OR X$="<=L" THE
N GO TO NOT PI
```

Tyd-Byte from the desk of Kent Cook

SyncWare News

CONTENTS

For Your Support....	3
Forum....	4
M*5 Grand Prize Winner in our Contest....	7
Paul Holmgren	
MULTISTEPS Best 1000 Entry....	9
Alex Sweitzer	
Yet Another ZX/TS Fix....	12
Nachbaur	
ANIMALSLLL Best 2068 Entry....	13
Larry Liedtke	
Basil's Compendium....	18
Wentworth	
PC8300: The ZX81 Clone....	19
Nachbaur	
BBSing on an Unexpanded 2068....	21
Davis	
Dot Matrix Bit Graphics....	22
Hartung	
Oliger DOS v.2 & Pro/File Cartridge....	24
Cook	

FIRST-CLASS MAIL
U.S. POSTAGE
PAID
Jefferson, NH
Permit No. 1

H.H. Armstrong
5301 Porter Ranch Rd
Garden Valley, CA

95633

5:2

Editor:
Jeffrey Moore
602 S. Mill Street
Louisville, OH 44641

Technical Director:
Fred Nachbaur
C-12, Mtn. Stn. Group Box
Nelson, BC V1L 5P1 Canada

Advertising, Subscriptions:
Thomas B. Woods
P.O. Box 64
Jefferson, NH 03583

Submissions, announcements, letters to the editor,
and all other material of editorial interest should
be sent to the Ohio address.

Copyright 1987 SyncWare News

Subscribe ! \$16.95

For Canada and Mexico please add \$3.00 postage.

1 year (6 issues)